

whether he thinks it is a general rule. The question should be confined to this case.

TRIAL EXAMINER: You may answer the question.

THE WITNESS: Well, I think it is a general rule, but I imagine there may be instances in which the Commission might not deduct it under the terms.

By MR. HULL:

Q. Well, now, in that definition it is clearly stated that the deduction of the aggregate credit balances of current [12298] depreciation accounts are to be deducted "if and to the extent that such items have been accumulated during the period of the license from earnings in excess of a fair return on such investment."

That qualification is in there, is it not? **A.** That is right.

Q. So that unless that condition is met, no deduction need be made under that definition. Isn't that right? **A.** That is correct, yes.

[12299] **Q:** And you tell me you have made no inquiry to determine what was a fair return, and of course you could not without that determine whether or not the present aggregate balances have been accumulated in excess of a fair return. Isn't that right? **A.** That is correct.

[12304] **Q.** I asked you, as I recall yesterday, whether the purpose or one of the purposes of the reserve wasn't to provide for the replacement of property. I understood you to say it was [12305] to provide for the retirement of property. Then I asked you whether indirectly that is not for the purpose of replacing property, and I asked you at transcript 12,234, beginning at line 1, this question:

"To the extent of the original cost of property in service, the collection of depreciation expense and the holding of assets reflected by the reserve are for the purpose of insuring continuity of service through replacement of

equipment. Isn't that the fact?" Your answer given at line 9 is "No".

Now, was that answer correct in the light of what you have just testified to?

A. Yes, the answer still stands.

[12308] THE WITNESS: The depreciation payments made by the consumer are made so that he will bear the total cost of rendering service to him, and to return to the company the original cost of the facilities used in such service by the time of [12309] its retirement.

[12315] Q. Mr. Newlands, when an electric utility company finds it necessary to use capital for the replacement of property, what sources of capital are available to it?

MR. GOLDBERG: The same objection, Mr. Examiner. We are completely beyond the realm of any responsibility that this signature on Exhibit 61 implies.

TRIAL EXAMINER: The objection is overruled.

THE WITNESS: The company can use any cash on hand, or it can borrow the money from banks, on bonds, from investors, on notes, or it might even sell additional common stock or request its common stockholders to make a contribution to the company.

By MR. HULL:

Q. You don't mean by that assess the common stockholders? A. That is a possibility under some State laws. It isn't often done, or by the sale of additional common stock.

Q. It is a possibility under the Federal Power Act?

MR. GOLDBERG: I object to that.

MR. HULL: He has injected it.

TRIAL EXAMINER: He may answer the question.

[12316] THE WITNESS: The Federal Power Act, so far as I know, is mute on that point. That is a question for individual State laws.

MR. GOLDBERG: That is lawyer Newlands' statement.

. . .

[12318] Q. Mr. Newlands, would it not, instead of using a depreciated net investment rate base, be more just and equitable to both consumers and investors for a regulatory commission to use an undepreciated rate base and allow to the consumers a credit on the reserve for depreciation equivalent to the risk free rate of return on such balance?

. . .

[12319] THE WITNESS: In my opinion that would not be a fair and equitable procedure.

By MR. HULL:

Q. Would you state your reasons? A. Because the company should be entitled to earn only on the amounts of its net investment in the plant. To allow the company an additional return on a depreciation reserve in effect charges the consumer twice for the service he is getting.

Q. Just explain how he is charged twice. A. Because the consumer is already charged with the cost of giving the service, including a portion of the cost of the facilities of the company which have been used up in the service to the consumer during the year. He should not again be charged with an interest rate on a depreciation reserve.

Q. I didn't say charged with an interest rate on the depreciation reserve. I suggested his being given a credit on the balance in the depreciation reserve equivalent to the risk free rate of return on such reserve.

MR. GOLDBERG: You haven't mentioned the other side of it, [12320] with depreciation on an undepreciated investment.

MR. HULL: That is correct.

THE WITNESS: Well, that still means charging the consumer with the difference between the rate of return allowed to the company and the rate of return on risk free securities which in my mind has no bearing at all on the amount of return which the company should earn, which the investor should receive.

[12344] Q. Is it a fact that the annual depreciation provision by Penn Water consists of a base figure of \$355,146.73, plus 2½ per cent on net additions since 1930 which provision is included in the Power Bill? A. The provision for depreciation on Penn Water and Power Company's books is determined by taking the same amount of depreciation based on service lives which had been taken in the year 1930, and adding to that 2½ per cent of net additions, as reported in the Power Bill.

Q. And the depreciation provision as thus made up is included in the power bill? A. In effect that is so, yes.

Q. Now, is it also true that this amount of annual depreciation provision so determined is credited to Account 250, Reserve for Depreciation? A. By the amount of depreciation so determined you mean the 355,000 plus the 2½ per cent?

Q. That is right. A. That is correct.

[12468]

EDWARD L. DUNN

CROSS-EXAMINATION

By MR. HULL:

[12485] A. You will find that by referring to page 18, the balance per books as of December 31, 1945, is \$8,976,358. However, due to the fact that the books do not reflect certain retirements which have been made but not recorded there is an adjustment necessary to the book reserves.

As the result of this adjustment and several other minor adjustments the depreciation per books as adjusted at December 31, 1945, is \$8,763,118. The reserve requirement as of December 31, 1945, is \$8,408,373.

Now, there is a slight difference in the two figures because the reserve requirement does not include provisions for maintenance and the company has indicated that its book reserves are supposed to include something for maintenance.

. . .

[12530] Q. Is there any account in the uniform system of accounts [12531] wherein you record as a single figure what you have termed as the net original cost? A. No, the system of accounts is designed to record depreciation reserves and the related plant cost separately as a matter of convenience and presentation. However, they should always be considered together. They are related items.

Q. On which side of the balance sheet does the original cost appear? A. On the lefthand side of the balance sheet.

Q. And the reserve for depreciation under the system of accounts appears on the righthand side? A. Yes, that is a matter of form. It is still a contra-account to plant investment.

Q. When I referred to the lefthand side, I referred to the asset side of the balance sheet, and I take it that is what you had in mind, too, is it not? A. The lefthand side is assets and other debits.

Q. And the righthand side is what? A. Liabilities, reserves, and other credits, including capital stock, long-term debt, and so forth.

Q. And what accounting entries do you make upon the retirement of a piece of property? A. Well, without going through the detailed entries, I suppose it will be satisfactory to give you the accounts in which the retirement finally rests?

[12532] Q. That is right. A. Plant account is credited, and the reserve for depreciation is debited with the cost of plant. Cost of removal is debited to the reserve and any salvage value is credited to reserve for depreciation.

. . .

[12549] Q. Did any member of the Commission's Staff make a determination of actual depreciation? A. Yes, in my opinion the reserve requirement would most nearly measure the actual depreciation or accrued depreciation at the end of 1945.

. . .

[12550] Q. Mr. Dunn, does your Exhibit 61 constitute a study which determines the depreciation which actually exists in the property of Penn Water? A. In my opinion the reserve requirement would most nearly measure the actual depreciation or accrued depreciation which exists at the end of 1945.

. . .

[12554] Q. Mr. Dunn, in your opinion should the amount of the balance in the reserve for depreciation of an electric utility company bear any relation to the amount of actual depreciation which had occurred in the property? A. Yes. It is desirable, in a properly computed depreciation reserve.

Q. What should the relation be? Should they be substantially equivalent? A. Yes. A properly computed depreciation reserve should be substantially equivalent to the reserve requirement and the accrued depreciation in the property.

. . .

[12631] Q. Mr. Dunn, do you agree with this statement, that it is extremely important in determining profits that all expenses applicable to a given year or period must be stated in that period? A. Yes, that is a recognized principle of income determination.

Q. And it is because of that principle, is it not, that you charged depreciation annually and thus spread the original cost of the property over the depreciation expense accounts of the several years during the service life? A. That is certainly one reason for spreading depreciation expense over the period to which it relates.

* * *

[12638] Q. Now, why do you believe it is equitable to charge an equal amount to each account period? A. It is equitable from the standpoint of the consumers or rate-payers because they are charged an equal proportion of depreciation expense year by year. They are charged with all depreciation expense, and the charge is neither more nor less than the equal proportion of the cost of the property used in rendering public service. It is equitable from the standpoint of the company because it is enabled to appraise the financial progress of the company by means of comparative income statements that show the progress of the company from year to year without distortion of one of the largest items of operating expenses, which is the depreciation charge.

That remains relatively stable, and only changes as additions to plant occur. Therefore it affords a much better basis of comparison than unequal or arbitrary amounts charged [12639] to income in the operating expenses.

Q. Then you do believe that it is equitable both to the consumers and the investors to equalize this substantial cost, which is involved with the annual depreciation cost, equalize that over the period of the service life of the property. A. In the case of Pennsylvania Water and Power Company, that is particularly true. I might add that that is the method that has been used by the company for many years. It has recorded such a method on its books since 1920. It has made such computations and used them in its tax returns from the very inception.

* * *

[12640] Q. Mr. Dunn, do you agree that the cost of depreciation is a part of the cost of service of an electric utility?

A. Yes.

Q. And do you agree that all of the costs of service of the electric utility should be paid by the consumers?

A. Yes, all of the cost of service.

Q. And do you believe that in addition to all of the costs of service the investor should be paid a fair return upon the investment? A. The return on the investment is included in cost of service to the consumers.

Q. You consider that a cost of service? A. To the consumers, yes.

. . .

[12720] Q. In connection with your recommendation for the deduction of that depreciation reserve as adjusted from the net investment rate base, did you make any computation of the amount of the fair return to which the company was entitled in each year of its operating history? A. No, I did not make such a computation in connection with my determination although I did consider the past financial history of the company and the results of its operations.

Q. Then you made no determination of the extent, if any, to which the aggregate credit balances of current [12721] depreciation accounts had been accumulated from earnings in excess of a fair return on the company's actual legitimate original cost, did you? A. No, I did determine, however, that the company did recover all of its depreciation charges through revenues and in addition to that earn a substantial profit.

Q. By "substantial profit", do you mean a fair return? A. Well, I didn't determine what a fair return was, but as I recall the average profit was around 10 per cent.

Q. You did not, however, determine what the fair return was? A. I did not determine what a fair rate of return was, nor a fair return in the past.

. . .

[12725] Q. In the illustration I have put, does not the deduction of the \$10,000 in the reserve for depreciation from the investment rate base result in decreasing the utility operating revenues by the amount of \$600, which is the rate of return of six per cent multiplied by the balance in the reserve of \$10,000? A. It only results in a decrease in the return as between the first and second year. It does not necessarily [12726] result in a decrease in what the return should be in the second year. You are simply comparing two years, but in the first year there was no deduction, and one was required in the second year which is not comparable to the first year by reason of the fact that the company has accumulated depreciation expense through the medium of operating expenses. There is a different situation.

MR. HULL: Now, I ask the reporter to read the question and I would like you to answer the question.

. . .

THE WITNESS: That is the only answer I can make.

TRIAL EXAMINER: You answered on the basis of return and the question was on the basis of revenue.

THE WITNESS: It was net operating revenue, and return is synonymous with net operating revenue.

. . .

[12729] Q. Now, Mr. Dunn, the amount of \$600 which I have referred to is in fact six per cent on the original investment of 100,000—no, pardon me—is six per cent of the amount in the depreciation reserve balance at the end of the first year. A. What was the first part of the question? I didn't get it.

(Question read.)

THE WITNESS: I do not so consider it. I consider the fair return as the rate of return times the net investment, and not as related to the components of the investment.

. . .

[12740] Q. . . . You have testified that the purpose of the reserve for depreciation is "to provide for the retirement of property." Now, I call your attention to the fact that property is not retired until it is withdrawn from service. Nevertheless, the consumers have paid depreciation expense between the time of the installation of the property and the time of its retirement, and since the reserve is not necessary for any other purpose than to provide for the retirement of property, and since that comes at the end of the service life, the payments made by the consumers must be advances, must they not? A. Absolutely not. In the first place, the payments made by the consumers are not in the reserve. The payments made by the consumers were charged to operating expenses, that is the depreciation expense is charged to operating expenses.

Q. And a credit to the reserve? A. Well, the money recouped comes into the company in the form of revenues, not in the form of a depreciation reserve.

Q. That is quite true, but concurrently there is a [12741] credit to the reserve for depreciation. A. Yes, but that is not an advance.

Q. No, the bookkeeping entry of the reserve for depreciation isn't an advance. A. Nor neither is the charge.

Q. But the money that comes in to the company and is credited to the depreciation reserve is an advance from the consumer, is it not? A. No, it is not.

[12744] Q. Mr. Dunn, do you agree with this, that depreciation accounting results in the accumulations of money by a utility which are commonly referred to as depreciation funds or depreciation reserve funds? A. Not ordinarily. The depreciation accounting could result in an accumulation of such funds if a separate depreciation fund were maintained on the balance sheet.

Q. In that event you say it would? A. It could result in that, yes, not necessarily result in it even then in case depreciation funds were not recouped.

Q. Now, if there is no ear-marked fund or funds, nevertheless the amount shown in the reserve for depreciation has actually been collected in cash from the consumers as depreciation expense and used to acquire other assets, there are nevertheless depreciation funds, are there not?

A. Of course the depreciation charges that are collected from customers are much greater than the balance in the reserve because the balance in reserve has been reduced by retirement in the past.

[12745] If those charges have been retained in the business and invested in other assets, they are no longer referred to as depreciation funds because they have lost their identity.

Q. Would it be proper to refer to them as assets representing depreciation reserve balance? A. No, because it might be that the company has used the money to retire its bonds or some such procedure and there is no validity to the assumption that they have been retained in the business unless they can be identified.

Q. Do you agree that accumulated depreciation funds can't be returned to the investors of the capital but must be retained by the utilities so that when utility plant wears out in service funds shall be available to provide new facilities in replacement of the worn out plant? A. No, I do not agree with that. In fact, the statement is incorrect even as a theory.

. . .

[12790] Q. Have you included any amount in Account 100.3, Construction Work in Progress? A. Yes. The company sometimes had jobs which have been completed, but not actually recorded on the books as plant in service, and we have allowed those jobs which the company has included in the power bill, but which are still carried in the account Construction Work in Progress in the rate base.

Q. When a utility company undertakes the construction of new plant, at what point is the cost of that construction entered in the account "Construction Work in Progress"? A. The cost is entered in that account promptly

upon the posting of the vouchers making payment for labor, materials, supplies, and so forth.

Q. So that assuming that the construction period extended over a period of twelve months or eighteen months, and were made continuously during that period, the charges each month would properly be posted to Account 100.3. Is that correct? A. Construction work in Progress, yes.

Q. And when so posted, they would be proper to include in a net investment rate base, would they not?

[12791] A. Not if the company was capitalizing interest during construction on the work in progress, because the plant in service would be only the completed work.

Q. Well, I understand that. The company can't expect to get both interest during construction and get the construction work in progress during the period included in the rate base, but—

[12799] Q. Has any part of Penn Water's investment in dams, reservoirs and waterways been excluded from the rate base in your calculation? A. No, we have allowed all the investment.

Q. You have not included in your net investment rate base any part of the assets reflected by the depreciation reserve balance, have you? A. Those assets are not identified, if there are such assets.

Q. Whether identified or not, you have not included them in your net investment rate base. Isn't that true?

[12800] A. If the cash generated by depreciation charges, which in the case of Penn Water have been fully recouped by the company, has been invested in plant, they are included, or it is included in the rate base.

Q. Is your answer complete? A. Yes.

Q. If any part has been invested in securities, it has not. Is that correct? A. The company does have quite substantial investments in securities, and those investments are not included in the rate base.

[12801] Q. Do you know whether or not the Federal Power Commission has at anytime determined what was a fair rate of return for Penn Water? A. Not that I know of, and I am reasonably certain that this is the first rate case the Federal Power Commission has had with Penn Water.

. . .

[12803] Q. In your opinion, does the cost of service of an electric utility company include a return on the entire investment which the stockholders have made in the company? A. Not necessarily, because the fair rate of return is applied to the investment. The net investment in property used and useful in rendering public service. If part of the investment is devoted to non-utility properties, the company is not entitled to receive from its ratepayers a return on such investment.

. . .

[13255] Q. Do I understand that you would compute a net investment rate base under part 1 of the Federal Power Act in a different manner than in which you would compute a net investment base under part 2? A. If you understood that it is erroneous. I made no computation under part 1 of the Act.

. . .

[13256] Q. In determining a net investment rate base, would you determine differently under that definition than you would if you were applying part 2 of the Act, for instance, to property which was not licensed? A. I don't know. I have made no study of what I would do under that sub-section in this case.

Q. How would you compute the net investment rate base under part 1? A. It would depend on the facts of the case.

[13257] Q. Take the facts in the present case. A. I have not made a study of that. It is too involved. Besides, the company does not yet have a license.

. . .

[13259] Q. In making that computation of average and net plant balances, and the figures "average base" in column 9, did you or did you not consider the definition of net investment as contained in Section 3, sub-section 13 of the Federal Power Act? A. I did not consider it as related in that particular section. That is, I did not go to that section and read what net investment was and then arrive at these figures. I knew what net investment was under the rate cases the Commission has had in the past where they have used a net investment rate base.

Q. Are the figures which you have arrived at in Exhibit 57 figures which would be arrived at by the application [13260] of the definition of net investment in Section 3, sub-section 13 of the Act? A. As I previously stated, I have made no study of that.

Q. So you do not know whether it reflects net investment as there defined or not?

. . .

THE WITNESS: As I say, I have made no study of what net investment would be applying that sub-section to this property.

. . .

Q. And the concept of net investment which you did apply is what you understand to be the concept as found in the decisions of the Federal Power Commission. Is that correct? A. Well, it is more than that. I have testified on what net investment is in many rate cases, and the Commission has used that figure in its rate cases, so I know what the figure of net investment is in the Commission's rate cases.

Q. All right. Is net investment, as the Commission has applied it, computed in the same manner under part 1 and part 2 of the Act? A. In the only instance that I can recall where that occurred, it was.

[13261] Q. If depreciation expense is properly computed, collected and accounted for, the cash received as operating revenues is received by the company in advance of the time

when the property to which it relates is retired. Is that not true?

. . .

THE WITNESS: Of course, your statement contains an assumption as to the fact that such cash is actually collected in revenues. If it is, it is collected before the plant is retired because the depreciation allowance is for the current consumption of plant in service.

By Mr. HULL:

Q. And the corresponding credits that are made to the reserve for depreciation are also made in advance of the charges that are made to the reserve for depreciation when the property is retired. A. The credits to the reserve are made currently with the accrual of depreciation.

. . .

[13268] Q. When you say it that way, do you include the reserve for depreciation among your liabilities? A. No, I never include the reserve for depreciation among the liabilities under any circumstances. It is not a liability.

. . .

[13318] Q. Mr. Dunn, apparently the capital surplus arises in that case because my assumption regarding plant account [13319] was not large enough. If the plant account were \$200,000 and the capital stock \$200,000 and the company had \$75,000 in cash and \$75,000 depreciation reserve, where would the difference between the depreciated original cost of the plant and the proceeds of insurance finally be reflected? A. Well, it is too difficult to give offhand answers to all of those assumptions. I can tell you tomorrow, if you wish.

Q. All right. I wish you would.

MR. GOLDBERG: In that assumption I take it the plant is \$200,000.

MR. HULL: That is right.

MR. GOLDBERG: Reserve for depreciation is \$50,000.

MR. HULL: Just a minute. Let me give the assumptions and we will get the answers tomorrow.

MR. GOLDBERG: All right.

MR. HULL: Original cost of the plant, \$200,000; cash and securities, \$75,000; total assets, ~~\$275,000~~; capital stock, \$200,000; reserve for depreciation, \$75,000; total liabilities, \$275,000.

MR. GOLDBERG: Destruction of the whole plant by fire?

MR. HULL: No, a destruction of the group of property, the original cost of which was \$100,000. The insurance recovery is \$75,000, and the depreciated original cost of the property destroyed by fire is \$50,000.

[13320] THE WITNESS: I am not sure but what I might need all the facts that would ordinarily be made available to me in that set of circumstances since you started to break down the reserve. I might need to know what the depreciation rate was, what the estimated service life was, what the age of the property was, and what the property was, and so on and so forth.

By MR. HULL:

Q. If you follow my assumptions—— A. I don't like to have these questions answered in the dark and then have them related to a specific case such as P.W.&P. Company.

Q. If you follow my assumptions that the depreciated original cost of the property destroyed is \$50,000, you need no assumptions regarding service life or age. A. Oh, there might be an erroneous balance in the depreciation reserve which might affect the conclusions that I would reach.

Q. Oh, yes, and it might be that somebody faked the books and the actual capital stock liability was \$250,000. But we are not dealing with assumptions like that. A. I don't know what we might get into.

Q. Just assume that the entries in the balance sheet are as I have given them to you, and that after properly computing a depreciation reserve with respect to the plant [13321] that is destroyed by fire the depreciated value is \$50,000. You need not make any assumptions about service life at all. A. You say out of \$200,000 of plant, \$100,000 was destroyed?

Q. Plant representing \$100,000 of original cost. A. And the reserve for that, the proper reserve for that was—

Q. \$50,000. A. —\$50,000. Proper reserve for the balance of the plant was \$25,000?

Q. That is right.

MR. GOLDBERG: Insurance recovery is \$75,000.

MR. HULL: That is right.

THE WITNESS: I will give you the answer to that later.

MR. GOLDBERG: Has the question already been asked? Is the question what are the entries that would be made upon recovery?

By MR. HULL:

Q. What entries would be made to reflect the effect of the destruction of the property and the collection of proceeds on the plant account, and upon the reserve for depreciation, and I would like to know also where the difference between the depreciated cost of \$50,000 and the proceeds of insurance of \$75,000 will finally be reflected on the balance sheet. [13322] A. I don't believe I can answer that problem because it indicates that there might possibly be a reserve adjustment necessary and you just can't determine these reserve adjustments in the abstract. You have to have more information.

I would have to know all the facts that could be ascertained of the company's past financial policy and history by the Regulatory Commission with respect to depreciation in the past. I would be interested in knowing whether any reserve adjustments had been made in the past and why. I would be interested in knowing the estimated future life of the property. I would be interested in knowing whether the reserve had been recouped, whether the depreciation charges always had been recouped through earnings and so on.

Q. Mr. Dunn, the simple question I asked you is in conformity with the instructions and regulations of the uniform system of accounts? A. No, it isn't, Mr. Hull. It involves possibly a reserve adjustment, and the circumstances under which the depreciation reserve can be adjusted are not set forth in the system of accounts.

Q. Is it my understanding, Mr. Witness, that when you have a fire loss all of these problems you suggest are presented? A. If you lose fifty per cent of your plant in a fire loss, I assure you that very serious problems are presented.

[13323] Q. You have told me a lot of things you would be interested in knowing.

Can you tell me the things that you must know in order to give me the answer? A. The things I must know are all of the facts that can be ascertained regarding the company's past history and the estimated life of the property remaining.

. . .

[13358] Q. It is a fact, is it not, that if a reserve for depreciation for Penn Water is accumulated on the straight-line basis at rates determined by the estimated service lives shown in Exhibit 59, the reserve will be substantially greater throughout the life of the property than the amount necessary to meet retirements which are to be expected if the estimated service lives prove to be correct? A. That

will be true under the straight-line method or any other depreciation method.

Q. The excess of the reserve for depreciation over the estimated retirements, however, would be greater under the straight-line method than under any other method of depreciation accrual, would it not? A. I have a little trouble with your statement "excess of the reserve over the estimated retirements." The balance in reserve would not relate to the property retired but the property not retired. [13359] Q. Yes, but the point of my question is that the amount in the reserve would be substantially in excess of the charges to reserve for retirement of property throughout the life of the enterprise, is that correct? A. That is the same as your first question.

Q. Yes. A. I believe the answer was "yes."

Q. And the excess I refer to would be greater if the straight-line method is used than if any other method of depreciation is used. Isn't that true? A. I don't know that you referred to any excess. There is no excess. It is the amount required. I will say this in answer to the latter part of your question: That the straight-line method creates a higher reserve balance, all other facts being the same, than an interest method such as the sinking fund method or compound interest method.

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[13374] A. When you record depreciation expense you record in operating expenses the current depreciation cost with a related entry to the reserve for depreciation. You do not record any payments received or money deposited.

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[13444] THE WITNESS: Are you referring to the two million dollars in the reserve for depreciation?

By MR. HULL: !

Q. Yes. A. As I said, that is a contra account to plant account, but no specific assets in the plant account can

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be identified as assets reflected by the reserve for depreciation.

[13609]

REDIRECT EXAMINATION

By MR. GOLDBERG:

[13615] Q. Now, I would like to draw your attention to the Accountants Handbook, third edition, W. A. Paton, Editor. And to page 747 thereof. At page 747 there is a paragraph which has this caption:

"Significance of Depreciation Reserve."

Is that right? A. That is correct.

[13616] Q. Will you read that, Mr. Dunn?

A. "Significance of Depreciation Reserve.

"The depreciation reserve or allowance, to the extent that it measures a careful and reasonable estimate of accrued depreciation, should be interpreted not as a true reserve, or appropriation of surplus, but rather as a contra account, or valuation account, modifying the gross book value of the depreciable fixed assets. In particular cases, the [13617] depreciation reserve may be in part surplus, as a result of setting up clearly excessive charges for depreciation, but this fact does not alter the nature of the typical reserve for accrued depreciation.

"The use of the term 'reserve', which is well nigh universal, is not altogether fortunate, particularly because of the standard use of this term in labeling genuine surplus appropriations, and also because a layman, in particular, tends to think of the depreciation reserve, when so named, as a fund of cash or other liquid assets set aside for the purpose of replacing the depreciating property at the end of its service life. The conventional depreciation reserve not only does not con-

sist of an actual fund, but can be said to represent or indicate a fund of property only in a very indirect way, if at all. The balance in the reserve or allowance for accrued depreciation represents just one thing—the estimated expiration in use of the depreciable property, shown in other accounts at cost or other gross book value. This can be emphasized by calling attention to the fact that it is quite possible to account for depreciation by avoiding the use of the reserve account entirely through the use of a procedure by which the credits are lodged directly in the plant accounts.

“The really significant element in the accounting for depreciation is the setting up of the charge to operation, [13618] and finally to revenue, by which the showing of net profit is restricted below the figure which would appear if the depreciation were neglected, and, as a result of which dividends are restricted to true net earnings and capital impairment is avoided.

“This does not deny the fact that where operation is successful—that is, where revenues are at least sufficient to cover all costs—assets tend to be built up at least to the amount of the accumulated balances in the reserve account, to take the place of the expired values, assuming the funds replacing expired values are not utilized in retiring liabilities or otherwise withdrawn from the business.

“Hatfield discusses three common misconceptions regarding the depreciation allowance:

- “(1) The view that it represents a fund of money;
- “(2) The view that it represents a reservation of profits;
- “(3) The view that it constitutes inherently a provision for replacement.

“He shows that none of these views is sound, by pointing out that the reserve account represents noth-

ing more than an estimated expiration of asset values, that depreciation goes on whether there are any profits or not, and that the recognition of depreciation is a 'condition precedent to the ascertainment of profits,' and that depreciation [13619] accounting should take the same form in the case of property which there is no intention or prospect of replacing as in any other case."

. . .

Q. Do you agree with the views expressed in the paragraphs you read? A. I do.

. . .

[14554]

HANINA ZINDER

was called as a witness, and after having been duly sworn and examined, testified as follows:

[14555]

DIRECT EXAMINATION

By Mr. MYSE:

Q. What is your full name, Mr. Zinder? A. Hanina Zinder.

Q. What is your business? A. I am a consultant to Public Utilities on rate matters.

Q. Will you outline briefly your education and experience? A. I graduated from Carnegie Institute of Technology with the Degree of Bachelor of Science and Electrical Engineering in 1924.

In 1926 I obtained a Degree of Master of Business Administration from Northwestern University, specializing in the field of public utilities.

Subsequently I attended the Central Station Institute of the Commonwealth-Edison Company of Chicago and received a certificate of completion. I completed this course in 1927. As part of this course, I spent three three-month intervals in various departments of the company. In these

departments we carried on certain duties at the same time on the operations of the department.

I also attended courses at the University of Wisconsin in working towards a Ph.D. degree.

So much for my education.

[14556] As to my experience, upon graduating from Carnegie Institute of Technology in 1924, I entered the employment of the Commonwealth-Edison Company in Chicago. With the exception of a short leave-of-absence, of about four months, I was continuously employed in the Commonwealth-Edison Company for a period of approximately six years. Two years of this time was spent in the operating department of the Fifth Street generating station of the company, which at that time was the largest steam-generating plant in the United States.

Subsequent to my completion of the Central Station Institute course of the Commonwealth-Edison Company, I entered the contract department of the company where I was employed for approximately three years. My duties in this department consisted of making reports on the comparative costs of electric service for large commercial and industrial establishments in Chicago as between generation by the establishment itself and purchasing its total requirements from the company.

These reports frequently required allocations of costs of service as between private plant generation and purchasing their entire electric requirements.

The total allocations were between cost of steam heating, processed steam and electric generation. The work also involved an intimate knowledge of large power rates and their proper application to various establishments.

While engaged full-time at the Commonwealth-Edison [14557] Company, some time was spent evenings assisting in the preparation of an employee manual on public utility economics for the Middle-West Utility Company.

During this same period I instituted jointly with Dr. Paul J. Ravér a course in public utility rates and subse-

quently conducted as well a course in public utility operation and management. It was my understanding that the course started by Northwestern University in Public Utilities was the first course of that type in any university.

This university activity continued until I left Chicago in 1931.

For a period of approximately four years commencing in 1931, I was a member of the Staff of the Public Service Commission of Wisconsin. For the major portion of this period my title was that of Chief Rate Analyst. My work with the Public Service Commission of Wisconsin involved supervising the work of other rate analysts on the engineering and economic phases of rate investigations of electric, gas and water utilities. This included studies to determine not only the reasonableness of the overall earnings of the companies investigated, but also the determination of the proper relative relationship of the various rates, both retail and wholesale, based upon studies of the cost of service.

While I was with the Public Service Commission of [14558] Wisconsin, I was engaged on several occasions, part-time, on rate work for the Tennessee Valley Authority. This included investigation in the determination and design of the original rates and rate provisions, both retail and wholesale, of the Tennessee Valley Authority. During this same period; that is, from 1931 to 1935, I was engaged as a rate consultant for the Electric Home & Farm Authority.

My duties with this authority were to design and recommend a rate policy.

In 1935 I joined the Staff of the R.E.A. where I subsequently became Chief of the Rate Division. My duties at first were to assist in the formulation and to recommend the rate policies to be followed by this Administration. Subsequently, in accordance with the rate policies adopted, I participated in or supervised the negotiation for the purchase of power at wholesale by hundreds of rural electric cooperatives throughout the United States. Some of the negotiations involved controversies that required both for-

mal and informal appearances before the State Commissions, including the making and presentation of cost studies.

In December of 1937 I left the Rural Electrification Administration to join the Staff of the Federal Power Commission, initially with the title of Principal Engineer.

In 1938 I was made Chief of the Division of Rates and Statistics, which position I occupied with some changes in [14559] the designation of the Division and its activities for a period of approximately seven years until January 1, 1945.

My duties and activities as a member of the Staff with the Federal Power Commission are, of course, a matter of record with this Commission.

Briefly, these involved the direction and supervision of Commission Staff activities involving statistics, rates for both electric and natural gas companies, and engineering on natural gas matters.

At the time I joined the Staff of the Federal Power Commission it had just instituted its first rate investigation. It was my responsibility to recommend, supervise and administer the type, scope and policies to be followed in these and subsequent investigations as to rate and engineering matters.

Beginning with the Albany Lighting case of the Commission, and on through each rate case of this Commission thereafter, practically all of them required investigations, studies, and exhibits to be prepared on the allocation of costs between so-called jurisdictional and non-jurisdictional business. The direction and supervision of this work was one of my major responsibilities.

During the war I directed the Commission Staff activities under the Presidential Directives regarding the review and approval of War Power contracts. Practically all of these contracts involved the sale of large blocks of power, [14560] frequently at special rates. The determination of the reasonableness of these rates in most cases involved studies of costs, and in many cases cost allocations.

Similar work was continued after the war in assisting the War Department, Navy Department, and Reconstruction Finance Corporation with respect to the renegotiation of War Power contracts.

[14561] On January 1, 1945, I left the Commission and joined Mr. E. Holley Poe in carrying on a private consulting practice, and subsequently became an associate of E. Holley Poe and Associates. I continued this association and activity until September 1, 1946. During this period I engaged in a general consulting and advisory practice on rate and related matters involving both private and public utilities in the United States and Canada.

I was engaged as a rate consultant by the Bonneville Power Administration, and still continue in this capacity at the present time. Also during this period, I assisted in the preparation of portions of the testimony on behalf of the Natural Gas Industry Committee before the Federal Power Commission in their Docket G-580 and testified in the Washington hearing in this case.

Q. Now, Mr. Zinder, were you requested by Pennsylvania Water and Power Company to make a study of its costs allocable to Consolidated Gas Electric Light and Power Company of Baltimore?

A. I was.

Q. Have you prepared a study showing your determination of the cost of service of the Pennsylvania Water and Power Company and Susquehanna Transmission Company of Maryland allocable to Baltimore Company?

A. I have.

[14562] MR. MYER: I ask to have marked for identification the document described as "Determination of Cost of Service of Pennsylvania Water and Power Company and Susquehanna Transmission Company of Maryland to Consolidated Gas Electric Light and Power Company of Baltimore." I understand the next Exhibit number is 319.

Wm. H. Eichhorn, Jr., Direct

TRIAL EXAMINER: Yes. The document may be marked Exhibit 319 for identification.

(The document referred to was marked for identification as Exhibit Number 319.)

. . .

[14569] Q. Does Exhibit 319 show the costs of Penn Water and Susquehanna properly allocable to Baltimore Company?

. . .

[14570] THE WITNESS: It does.

. . .

[14573] WM. H. EICHHORN, JR.

was called as a witness, and after having been duly sworn and examined, testified as follows:

DIRECT EXAMINATION

By MR. KING:

Q. Will you give your full name for the record, Mr. Eichhorn? A. Wm. H. Eichhorn, Jr.

Q. What is your present position with the Pennsylvania Water & Power Company? A. Secretary and Assistant Treasurer.

Q. Will you state your educational background for the record, please? A. I am a graduate accountant, and a Certified Public Accountant in the State of Maryland.

[14574] Q. Will you state your experience, please? A. I have been employed in accounting work since 1926. Since 1931 with the Safe Harbor Water Power Corporation and Penn Water & Power Company.

Q. Mr. Eichhorn, have you prepared a statement showing reconciliation of the Federal Power Commission Staff's recommended disallowances from the company's electric plant accounts pursuant to Exhibit 51, Schedule 2, and testimony as presented by witness Newlands with Penn

Water Exhibit No. 25, consolidated statement showing original cost of electric plants as of December 31, 1945? A. I have.

Q. I show you a document consisting of a summary and five sheets with supporting schedules A to Q and ask you whether this is the statement of reconciliation to which I have just referred. A. Yes, it is.

TRIAL EXAMINER: The document will be marked Exhibit 320 for Identification.

[14575] By MR. KING:

Q. Will you state briefly the purpose of this exhibit, Mr. Eichhorn? A. The exhibit is for the purpose of reconciling mathematically the Staff's proposed disallowances from the original cost as shown in Exhibit 51 with the company's Exhibit 25, and it sets forth the differences as items.

Q. Will you describe them briefly in this Exhibit 320? A. If you will turn to page 1 you will see that items 1, 2 and 4 make up the total amount shown as item 5, which is total electric plant recommended for allowance by the F.P.C. Staff.

Items 6, 7 and 8 total as item 9, amounts recommended by the Staff for disallowance. They total \$3,753,843.75. The total of items 5 and 9 give you item 10, which is a total original cost of electric plant per Penn Water Exhibit 25. That amount is \$36,704,706.47.

Q. Did you say the totals of 5 and 9—I see it now, Mr. Eichhorn. Those totals give you item 10. A. That is right.

Items 11 and 12 are disallowances conceded by the company and the total amount is shown as item 13, \$99,806.39.

The deduction of item 13 from item 10 will produce the amount shown as item 14, the net revised original cost of

electric plant as of December 31, 1945, as claimed by the [14576] company.

Q. What amount? A. \$36,685,700.08.

Those items on page 1 are shown in more detail on pages 2 to 6 inclusive, and the items shown on pages 2 to 6 are further supported by schedules A to Q, which are pages 7 to 58, inclusive.

Q. Does that complete your answer, Mr. Eichhorn?

A. Yes, that completes the description of the schedule.

MR. KING: You may cross examine.

MR. GOLDBERG: Let me understand this. I think it is probably a statement which will have to come from Respondent's counsel.

Do the Respondents propose to submit other witnesses who will testify on the data, or any part of the data, in Exhibit 320?

MR. KING: The answer to your question is "no," Mr. Goldberg, but you will recall that heretofore we submitted for cross-examination, in connection with Mr. Gunn's cross-examination on original cost, Messrs. Wetzel, Bortner, Eichhorn and Chase, all of whom assisted Mr. Gunn in connection with the subject matter.

[14577]

CROSS EXAMINATION

By MR. GOLDBERG:

[14579] Q. . . . Do I understand that you have made no decisions in preparing Exhibit 320 as to the propriety of the claimed costs. Is that right? A. That is right. It is purely a mathematical reconciliation setting up Commission disallowance, less the Company disallowance, and the net difference.

[14591] Q. As a matter of fact, if we look at Schedule K-1, you have a column entitled "Title of Job Order and Description of Item." Is that right? A. That is right.

Q. Those paragraphs that appear along with each item under that column are intended to be, I take it, items of explanation of the amounts which appear in the schedule. Is that right? A. Yes.

Q. That explanation isn't necessary for your reconciliation, is it? A. Well, I believe the explanation is necessary to [14592] an understanding of it, yes.

Q. Is there any explanation in either Exhibit 26 or Exhibit 27 of Job Order C-193? A. No, not in Exhibits 26 or 27, but these figures are a part of Exhibit 25.

Q. Is there an explanation in Exhibit 25? A. No, there is no explanation in Exhibit 25.

Q. You could have made a reconciliation between the staff's allowances and disallowances with respect to original cost and the company's claims regarding original cost without these explanations in Schedule "K". Isn't that so? A. No.

Q. Why not? A. Because they are not explained in Exhibit 51.

Q. Are they explained in your exhibits which were part of your direct case? A. This is the only place in the record that I know that they are explained because they were not explained in Exhibit 51.

Q. Now, then, you can make a reconciliation without that explanation. Isn't that so? A. Not an understandable one I believe.

Q. In other words, nobody would know what Job Order C-193 was about in connection with the company's claim unless you made this explanation which is in your reconciliation. [14593] Is that it?

THE WITNESS: That is true, and I believe the reason is that in the staff's Exhibit 51 the item was not set forth and explained what it was.

[14598] Q. Mr. Eichhorn, looking at page 35 of Exhibit 320, these descriptions that appear under the column entitled "Title of Job Order and Description of Item," are they verbatim copies of what appears in the job order as a description of the item? A. No, I don't believe they are verbatim descriptions of the job order. It probably has been added to a little for explanatory purposes.

Q. The explanation under the first one, for example, who prepared that explanation? Did you prepare it? A. Well, all the explanations of these details came from Mr. Wetzel.

Q. In other-words, Mr. Wetzel gave you the year of expenditure, the job order, the title of the job order as he wrote it, and his description of the item. Is that right? A. That is right.

Q. You didn't examine the job order yourself to ascertain whether the description was an accurate one, did you? A. No. I assumed the description was an accurate one. I worked with Mr. Wetzel a long time and find he is very reliable and I can depend on what he gives me.

[14599] Q. Is that what you did, you depended on what he gave you? A. That is right, I depended on Mr. Wetzel for the details. Then, of course, all the schedules in the Exhibit 320 were submitted to Mr. Gunn and he made the final decisions as to what was to be in here.

Q. Did Mr. Gunn review the job orders? A. No, he did not review the job orders.

Q. Where does the information come from indicating that the amount involved in connection with the first item on page 35 was charged to the reserve for depreciation?

THE WITNESS: That came about in connection with our determination of original cost. That work all was done under Mr. Wetzel's supervision.

By MR. GOLDBERG:

Q. Mr. Wetzel, I take it, also supplied you with the information that certain amounts were either charged to the

reserve for depreciation or operating expenses on the company's books. Is that right? A. That is right, the detailed records of the original cost determination are under his charge and were made under his supervision.

Q. Who prepared the caption appearing on page 35, [14600] "Summary of Betterments, Arising Through Minor Items Charged in Error to Operating Expenses or to Reserve for Depreciation"? A. I believe I prepared the caption. I talked to Mr. Wetzel about the items he had given me and prepared the caption.

Q. When you say you talked to Mr. Wetzel about the items he had given you, did you talk to him for the purpose of securing an accurate title for the items? A. Yes, I asked him to make an accurate title. I believe these titles he has here are accurate.

Q. Did he write that title which I quoted? A. "Summary of Betterments—", etc.

Q. Yes. A. Well, I don't believe he wrote the title other than as I suggested it be written.

Q. Did you determine that all of these were betterments? By "all of these" I mean the items listed in the various schedules in K. A. Based upon the information he gave me, yes. We discussed them generally and I asked that a schedule be made up showing those that are betterments as distinguished from those that were additions and those that were replacements.

Q. And he gave you the segregation as it appears in Exhibit 320. Is that right? A. That is right.

[14601] Q. Did you decide that the items had been charged in error either to the operating expense accounts or to reserve for depreciation?

THE WITNESS: Well, based upon the data that he gave me as to the items it appeared to me that they were in error.
By MR. GOLDBERG:

Q. Did you decide that they were charged in error? A. Based upon the data he gave me I decided that they were in error.

Q. Did you select the caption "Charged in Error" which is the heading for two columns appearing on page 35 and the other pages all the way through, at least, page 45? A. You are speaking about the items as they appear here in this exhibit and not as they originally occurred in connection with the original cost study, I presume?

Q. That is right. A. Because I make a distinction of that type for this reason: Originally these items were discussed by Mr. Gunn, Mr. Luther, Mr. Wetzel and myself occasionally as they came up in connection with the original cost determination.

Mr. Gunn, along with counsel and myself, made the joint [14602] determination that all of these items that you see here in the K Schedules and in addition the ones which are set forth in Exhibit 51 in entries 18, 23 and 24 of that exhibit were in the nature of accounting errors, and that was the basis upon which I used the heading here, "Charged in Error" which you see in the K Schedules.

MR. KING: Of Exhibit 320?

THE WITNESS: Of Exhibit 320.

[14605] Q. You spoke of the items being in the nature of accounting errors. What do you mean by "in the nature of accounting errors"? A. Simply that they were in error.

Q. You didn't say they were in error. You said they were in the nature of accounting errors. What does that mean? [14606] A. These items apparently were charged on Schedule K-1 starting on page 35. The items were charged to the reserve for depreciation or operating expenses instead of to electric plant.

Q. What enabled you to conclude that it was in error? So far I have not seen anything that is wrong. What made it in error? That is what I am trying to get at. A. Are you referring now to Schedule K-1?

Q. If you wish, you can talk about that one. That begins on page 35. A. That is right.

Based on the information on Schedule K-1, for example, the excess cost of the enamel signs over the estimated cost at current prices of varnished and baked signs being replaced in the amount of \$336.24 should, at the time the cost was incurred in 1923, should have been charged to electric plant instead of the account "Reserve for Depreciation."

Q. Why? A. Because that is a proper place to have charged that type of cost.

[14614]

HERBERT B. DORAU

DIRECT EXAMINATION.

Mr. HULL: Mr. Examiner, Dr. Dorau has been sworn and his qualifications are of record at transcript 797 to 801.

By Mr. HULL:

Q. Dr. Dorau, do you have your rebuttal testimony before you? A. Yes.

Q. Were you supplied with a copy of the Commission Exhibits 59 and 61? A. Yes.

Q. Did you request the Pennsylvania Water & Power Company to classify its depreciable property according to the estimated lives offered in Exhibit 59? A. Yes.

[14619] TRIAL EXAMINER: The Examiner directs the witness to hand the Reporter a copy of the exhibit he has before him and the Reporter will mark it Exhibit 321 for identification.

(The document referred to above was received and marked for identification Exhibit 321.)

[14621] By MR. HULL:

Q. Did you also request the company to prepare for you according to your specifications a distribution of property retirements as they would have taken place and would take place according to the life estimates as offered in Commission Exhibit 59, over the period 1911-2010? A. Yes.

Q. Did you also request and have prepared under your direction a calculation of the annual gross increment to a depreciation reserve on a straight line accrual basis using the estimated lives as set forth in Commission Exhibit 59 and the investment of the Company in depreciable plant by years from 1911 to December 1945 as determined by Commission Staff and a constant dollar investment balance from 1946 to 2010? A. Yes.

Q. In the preparation of the annual gross increment to a depreciation reserve on a straight line basis and other bases for which you used the investment of the company in depreciable plant what assumptions if any did you make as to the years subsequent to 1945? A. I assumed that retirements would be followed by replacements so as to maintain a constant investment balance by years for the period 1946-2010.

Q. Where are the results of these calculations set forth? [14622] A. On Exhibit page A-1 of my exhibit (Company Exhibit No. 321).

Q. Will you explain the tabulation on exhibit page A-1? A. Column 1 of this tabulation records a 100 year period set forth as years 1 to 100. Year 1 is 1911 and year 100, the year 2010.

Column 2 sets forth the cumulative retirements of depreciable property by years on the basis previously explained.

Q. I notice that the total in Column 2 reaches \$30,129,460 in the 100th year, a sum in excess of the investment in depreciable property. Why does this occur? A. By the year 2010 and, in fact to some extent before, shorter lived property will have gone through one or more life

cycles of investment, retirement and replacement and thus appear more than once in the gross cumulative total by years.

Q. Will you continue with your explanation of the tabulation on exhibit page A-1? A. The third column on exhibit page A-1 reduces the cumulative accrual of retirements as forecast by Commission Exhibit 59 to a percentage basis with the total at the 100th year as 100 per cent.

The purpose of reducing the cumulative gross retirement forecast to an index is to afford comparison with the rate of accrual of a so-called depreciation reserve on the [14623] alternative bases indicated in columns 4, 6, 8 and 10 of this tabulation.

Reference to column 3, (the cumulative per cent accrual of estimated retirements) indicates that after an elapse of 43 years, 43 per cent of the period, less than 1 per cent (.75) of the anticipated retirements will have taken place and that after 50 years, i.e., an elapse of half the period, only 8.32 per cent of the retirements estimated to occur in 100 years will have taken place. Even after 75 years, an elapse of three quarters of the period, less than 50 per cent of the estimated 100 year retirements will have taken place.

Q. What significance do you attach to the rate at which estimated retirements actually accumulate? A. The rate of accumulation of retirements of the property of this company is very slow, a large part of the investment consists of long lived property, so that the average estimated life is long and the date at which the liability to retire and replace matures is very remote. The economic significance of such a liability decreases with futurity and thus the bases of reserve accrual which, although wrong in principle may be practical enough when applied to short lived property, lead to economically absurd results when applied to long lived property and wholly unreasonable consequences when applied to such extremely long lived [14624] property as that of a hydro-electric establishment.

Q. Have you determined the average estimated life of the dollar investment in the depreciable property of Pennsylvania Water and Power Company? A. Yes, the dollar weighted estimated life (using the estimates of Commission Exhibit 58) and the 1945 investment of \$26,718,506 was 64 years.

Q. Have you prepared a distribution of the \$26,718,506 1945 investment in depreciable property by estimated life expectancy? A. Yes, the distribution in dollars and per cent, cumulative and non-cumulative is as follows:

Invested Dollars			Percentage	
Group	Group	Cum.	Group	Cum.
100 yrs.	3,558,389	3,558,389	13.32	13.32
75 yrs.	5,729,951	9,288,340	21.45	34.77
70 yrs.	5,123,481	14,411,821	19.18	53.95
65 yrs.	221,324	14,633,145	0.83	54.78
60 yrs.	114,831	14,747,976	0.43	55.21
55 yrs.	3,282,026	18,030,002	12.28	67.49
50 yrs.	1,448,397	19,478,399	5.42	72.91
45 yrs.	3,371,582	22,849,981	12.62	85.53
40 yrs.	1,234,316	24,084,297	4.62	90.15
35 yrs.	1,854,062	25,938,359	6.94	97.09
30 yrs.	644,222	26,582,581	2.41	99.50
[14625]				
25 yrs.	118,244	26,700,825	0.44	99.94
15 yrs.	17,681	26,718,506	0.07	100.0
Total	26,718,506		100.00	

Q. Will you continue with your explanation of the tabulation on your exhibit page A-1? A. In column 4 under the heading "straight line"—"dollars" there are set forth by years the accumulated amounts which would accrue on a straight line basis and on the basis of the life estimates of Commission Exhibit 59 applied to the investment made by Pennsylvania Water & Power Company.

The same accumulation on a percentage basis is set forth in column 5.

The accumulated totals in columns 2 and 4 may be compared and the relative rate of accumulation may be compared by reference to columns 3 and 5. Such comparisons will indicate for example that,

At the end of 43 years 34 per cent of the gross accruals will have been accumulated but only .75 of one per cent of the retirements will have been made and that even,

At the end of 61 years when 25 per cent of the retirements will have accumulated, over 55 per cent of the gross reserve accumulations will have accrued.

[14626] In columns 6 and 7 similar information is set forth for a 3 per cent interest basis, in columns 8 and 9 for a $4\frac{1}{4}$ per cent interest basis and in columns 10 and 11 for a six per cent interest basis.

Comparisons may be made on an absolute or percentage basis. Such comparisons disclose the high and rapid rate of accumulation of the accruals on a straight line basis when compared with either the accumulated volume or relative rate of retirements or the accumulated accruals on any of the interest bases. Thus for example after 43 years when,

34.29 per cent of the straight line accrual will have been accumulated, and only

.75 per cent of the retirements will have been accumulated,

23.92 per cent of the reserve accrual on a three per cent basis will have been accumulated and

20.47 per cent on a $4\frac{1}{4}$ per cent basis and

16.66 per cent on a six per cent basis,

the accumulated reserve on a three per cent basis will be \$8,950,907 as compared with \$13,842,846 on the straight line basis and \$7,467,502 on a $4\frac{1}{4}$ per cent basis and \$5,902,808 on a six per cent basis.

Q. Have you prepared a chart setting forth the relationship indicated on exhibit page A-1? A. Yes. It appears on exhibit page A-2 of this same [14627] exhibit.

Q. Will you briefly explain the chart on exhibit page A-2 of your exhibit? A. This chart sets forth graphically the facts developed in the tabulation on exhibit page A-1.

It may be readily observed that,

(1) through the first 40 years of the life of the property the proportion of the retirements which would take place according to the life estimates of Commission Exhibit 59 is insignificant and relatively inconsequential and that,

(2) the relative accumulation of gross increment to a reserve to meet the cost of such estimated retirements on the 3, $4\frac{1}{4}$, and 6 per cent accelerates more rapidly than and remains relatively well ahead of the gross increment of retirements but

(3) that the gross accrual on a straight line basis far exceeds in relative rate of accrual even that of the gross accrual on a three per cent interest basis and is absurdly in excess of the rate at which retirements are estimated to accrue and that,

(4) obviously the use of a common percentage scale eventually brings the several curves together [14628] at the 100 year point since the several totals are each treated as 100 per cent in the 100th year.

How different the absolute totals of accumulated retirements and the gross totals of reserve accruals on the various bases remain even after 100 years will be developed in later tables and charts.

Q. Are these relationships further developed and set forth in the chart on exhibit page A-3? A. Yes.

Q. Will you briefly explain the chart on exhibit page A-3? A. The chart on exhibit page A-3 differs from the one on exhibit page A-2 in that the vertical scale is in per cent rather than dollars. There are plotted against the same horizontal scale of 100 years the absolute dollar

values set forth in the table on Exhibit page A-1, columns 2, 4, 6, 8 and 10.

Examination of the chart on exhibit page A-3 indicates that,

(1) the absolute gross accumulation of estimated retirements is inconsequential for more than 40 years from inception, and that,

(2) the absolute gross accumulation of accruals on each of the alternative bases of [14629] reserve accrual is far in excess of the accumulated retirement requirements and that,

(3) the absolute gross accumulation of a reserve on the straight line basis at all times far exceeds the estimated cumulative retirements and is in excess of the estimated accumulated retirements after 100 years by more than 10 million dollars and in other years by the following amounts,

90th year	\$13,367,330
80th year	15,460,640
70th year	14,782,256
60th year	14,465,007
50th year	14,594,603
40th year	12,289,035

(4) the accumulated gross accruals to the reserves on the several interest bases in each instance and at all times are in excess of the estimated accumulated retirements by a wide margin of safety which in the case of the three per cent interest basis exceeds the estimates of accumulated retirements in certain years by the following amounts:

	100th year	\$ 7,296,114
	90th year	10,297,153
[14630]	80th year	11,613,702
	70th year	10,494,969
	60th year	9,781,073
	50th year	9,743,903
	40th year	7,513,521

Q. What is the purpose of the tabulation on exhibit page A-4? A. This tabulation sets forth the same facts as to estimated accumulated retirements and reserve accrual on the several indicated bases for the period 1946 to 2011. It differs in scope from the tabulation on exhibit page A-1. The accumulated absolute amounts and percentages are related to the calendar years indicated in column 1. The tabulation conveniently supplies the basis for the chart on exhibit page A-5.

Q. How does the chart on exhibit page A-5 differ from the one on exhibit page A-2? A. It is a cumulative percentage chart as the one on exhibit page A-2 but limited to the period 1946-2010, the horizontal scale is in calendar years. The larger horizontal scale is easier to read. The comparisons to be made are the same as on the chart on exhibit page A-2 and the same conclusions are appropriately drawn.

Q. Describe briefly the character and purpose of the tabulation on exhibit page A-6. [14631] A. The purpose of this tabulation is to afford ready comparisons between the investment in depreciable property and the reserve balances which would maintain on the basis of the life estimates of Commission Exhibit 59:

The assumptions on which the tabulations on exhibit page A-6 were developed are the same as those made in connection with the tabulation on exhibit page A-1. From 1945 a constant investment is assumed to result from replacement of retirements at an equal cost.

The tabulation on exhibit page A-6 can be related to the tabulations on exhibit page A-1. The difference between the cumulative estimated retirements of \$30,129,460 after 100 years as set forth on exhibit page A-1 and the stabilized investment of \$26,718,502 as set forth on exhibit page A-6 after 1945 represents the total of predicted retirements. The difference between the accumulated estimated retirements of \$30,129,460 and the accumulated straight line reserve accrual of \$40,367,910 (\$10,238,450)

is obviously the balance which would be found in a straight line accrued reserve under these same assumptions and circumstances as set forth in column 3 of the table on exhibit page A-6 at the 100 year level.

Similarly the reserve balances as set forth in columns 5, 7 and 9 are the same as the differences between the accumulated totals of estimated retirements as set forth in [14632] column 2 of exhibit page A-1 and columns 6, 8 and 10 of the same tabulation.

The relationships between the investment in depreciable property and the reserve balances on the various indicated bases of accrual are most readily observed by reference to columns 4, 6, 8 and 10 which set forth the percentage relationships between the reserve balances and the investment in depreciable property. It may thus be noted that,

(1) the highest ratios, for the first 100 years are reached on each basis at the end of the 82nd year when,

(a) the reserve balance on a straight line basis reaches 60.4 per cent

(b) on a three per cent interest basis 46.6 per cent

(c) on a $4\frac{1}{4}$ per cent interest basis 41.4 per cent

(d) on a six per cent interest basis 35.3 per cent.

The high relatively sustained level is reached as early as the 48th year with a 56.2 per cent reserve ratio on the straight line basis, 37.9 per cent on a 3 per cent basis, 32.1 on a $4\frac{1}{4}$ per cent basis and 26.0 per cent on a six per cent basis.

[14633] During the last 52 years of the 100 year period the average ratio of year end balances to the investment in depreciable property would be as follows:

on the straight line basis—54.1 per cent
on the 3 per cent interest basis—39.1 per cent
on the $4\frac{1}{4}$ per cent interest basis—33.9 per cent
on the 6 per cent interest basis—28.1 per cent

This means that a reserve accrued on a straight line basis would on the average for a consecutive 52 years exceed 50 per cent of the investment in depreciable property, and that even on a three per cent interest basis the reserve would stand at an average of almost 40 per cent of the investment in depreciable property for more than half a hundred years.

High average ratios of reserve balance to depreciable property will also maintain from 1945 through 1957. The average ratios of reserve balances to investment in depreciable property for the year period 1945-1957 on the several bases would be as follows:

on the straight line basis—47.9 per cent
on the 3 per cent interest basis—30.0 per cent
on the $4\frac{1}{4}$ per cent interest basis—24.6 per cent
on the 6 per cent interest basis—19.0 per cent.

Q. Does the chart on exhibit page A-7 set forth the [14634] facts tabulated on exhibit page A-6? A. Yes.

Q. Will you briefly point out the more significant relationships set forth on this chart? A. The chart on exhibit page A-7 records the percentage relationship of the reserve balances on various bases to the investment in depreciable property as set forth in columns 4, 6, 8 and 10 of the tabulation on exhibit page A-6.

It visualizes the rapid use of reserve balance ratios for the first 48 years and the striking rapid use of the ratio of the straight line reserve balance to the investment.

It is also clearly indicated and observable that the ratio of the reserve balances on the several bases remain high and relatively stable for a period of 40 years following the rapid rise of the first 48-50 years and that the ratio of the straight line reserve balance holds at an ex-

ceptionally high level as compared with the ratios of reserve balance found on the 3, 4½ and 6 per cent bases.

The substantial extent to which the reserve balance on the straight line basis exceeds that on the interest bases can readily be observed from the chart on exhibit page A-7. From the tabulation on exhibit page A-6 it may be determined that the annual reserve balance on the straight line basis exceeds that which would maintain on the several interest bases by the following amounts, at five year intervals:

[14635] Reserve Balance on Straight Line Basis
Exceeds Balance on

Year	3% Basis	4½% Basis	6% Basis
1945	4,456,381	5,730,750	7,030,413
1950	4,826,367	6,268,183	7,777,382
1955	4,915,061	6,435,033	8,051,959
1960	4,834,642	6,372,619	8,024,360
1965	4,699,148	6,233,115	7,893,317
1970	4,666,761	6,244,223	7,988,841
1975	4,477,622	6,038,095	7,796,113
1980	4,248,697	5,768,378	7,511,193
1985	4,013,324	5,480,172	7,194,768
1990	3,774,786	5,177,537	6,852,468
1995	3,371,402	4,617,230	6,113,193
2000	3,037,521	4,120,184	5,403,100
2005	2,946,871	3,940,102	5,087,196

Q. What general conclusion do you draw from the facts as developed in the tabulations and charts on exhibit pages A-1 to A-7, inclusive? A. The conclusions indicated by the facts alone are that,

(1) the estimated life of the depreciable property of Pennsylvania Water & Power Company is extremely long,

(2) the estimated life of a large proportion [14636] of the depreciable property of Pennsylvania Water & Power Company is beyond the limits of nor-

mal human discountability and calculation, i. e., beyond 40 and 50 years.

(3) accrual of a reserve to provide for the retirement of property at cost on a straight-line basis for such long life property results in the accumulation of a very large balance for very long periods of time (50 years and more) in excess of the cost of retirements, and that

(4) accrual of a reserve to provide for the retirement of property at cost on a 3 per cent interest basis for such long life property also results in the accumulation of a very large balance for very long periods of time in excess of the cost of retirements.

And furthermore as a matter of professional opinion I conclude that,

(1) the accrual of a reserve for the retirement at cost of depreciable property of such exceedingly long life on a straight-line bookkeeping basis results in an economic absurdity,

(2) the accumulation of a reserve against anticipated retirements more than 50 years in the future serves no practical or necessary business [14637] purposes,

(3) a basis of reserve accrual which results in an average reserve to investment ratio of 50 per cent for a future period of 50 years duration fails, by the test of common sense and end result, to establish a functional relationship to any necessary economic end, and that,

(4) a 3 per cent interest basis results in the accumulation of yearly and average reserve balances more than adequate to serve necessary economic ends and provide for the retirement of property at cost with a wide margin of excess of reserve for long periods of years.

Q. Did you make a determination of the number of years of future retirement liability, at cost of property, which the reserve balances accrued on a straight line, 3, 4 $\frac{1}{4}$ and 6 per cent interest bases would provide? A. Yes. The results are set forth in the tabulation on exhibit page B-1 and in graphic form in the chart on exhibit page B-2.

Q. Will you explain this tabulation on exhibit page B-1 and the chart on exhibit page B-2? A. The tabulation on exhibit page B-1 sets up opposite each year the number of years of future estimated retirements [14638] which the reserve balance as of the end of the indicated year will provide. Thus as of 1951 the reserve balance on a straight-line basis is equal to the total of the estimated retirements for the next 33 years or until 1984, on a 3 per cent interest basis the reserve balance would be equal to the retirement requirements for the ensuing 21 years or until 1972, on a 4 $\frac{1}{4}$ per cent interest basis the reserve balance would be equal to the retirement requirements for the ensuing 16 years or until 1967 and on the 6 per cent interest basis the reserve balance would be equal to the estimated retirement requirements for the ensuing 13 years or until 1964.

It should be obvious that this calculation does not include the continuing accruals on the several bases during the periods mentioned. This is clearly indicated by reference to the advance or subsequent years of retirements which the reserve balance at the end of the selected periods would still cover, thus,

(1) the reserve balance on the straight-line basis as of 1951 equals the retirement requirements for 33 subsequent years or until 1984 but by reference to 1984 it will be found that the estimated reserve balance is again adequate to meet the estimated requirements for the next 25 years,

(2) the reserve balance on the 3 per cent [14639] basis as of 1951 equals the retirement requirements for 21 subsequent years or until 1972, but by reference to

1972 it is found that the estimated reserve balance is again adequate to meet the estimated retirements for the next 21 years,

(3) the reserve balance on the $4\frac{1}{4}$ per cent interest basis as of 1951 equals the retirement requirements for 16 subsequent years or until 1967, but by reference to 1967 it will be found that the estimated reserve balance is then again adequate to meet the estimated retirements and then for the ensuing longer period of 17 years,

(4) the reserve balance on the 6 per cent interest basis as of 1951 equals the retirement requirements for 13 subsequent years or until 1964, but by reference to 1964 it will be found that the estimated reserve balance is then again adequate to meet the estimated retirements for the ensuing larger period of 15 years.

It may be noted that the calculations of the years of future retirement liability coverage which the various bases provide end at different years. The calculations for the straight-line bases in 1988, the 3 per cent interest basis [14640] in 1996, the $4\frac{1}{4}$ per cent interest basis in 1998 and the 6 per cent basis in the year 2000. In each instance calculations were discontinued when the number of future years coverage carried through the year 2010, the end of the 100 year period, the longest estimated life of any depreciable property class, thus by 1988, the reserve balance without reference to any additional credits would be sufficient to meet retirements through the year 2010 and similarly for the results on the other bases of accrual. Thus by 1988 the straight-line basis has accrued a sufficient balance to carry retirements through the period ending with 2010. Any accruals during the subsequent 22 years would provide an excess balance as of the year 2010. Similarly the 3 per cent, $4\frac{1}{4}$ per cent and 6 per cent interest bases would have provided the entire estimated retirement requirements respectively by 1996, 1998 and 2000 and similarly any addi-

tional reserve accruals would constitute excess balances at the year 2010.

A further basis of comparison of the results of the use of the alternative bases of reserve accrual may be provided by averaging the subsequent years of retirement requirements provided by the several bases of reserve accrual.

Limiting the period to the years 1911 through 1988 at which time the straight-line basis has accrued enough to carry retirements through the year 2010, it is found that [14641] the average years of subsequent retirements provided in advance are,

on the straight-line basis—31.8 years.

on the 3 per cent interest basis—24.6 years.

on the $4\frac{1}{4}$ per cent interests basis—23.2 years.

on the 6 per cent interest basis—19.2 years.

The chart on Exhibit page E-2 sets forth the relationships indicated by the tabulation on exhibit page B-1 graphically.

Q. What conclusions do you draw from the facts developed in and derived from the tabulation on exhibit page B-1?

A. The number of future years of estimated retirements which would accrue on the straight-line basis is substantially in excess of the years of future retirements which would be accrued on the 3 per cent interest basis and far in excess of the years of retirement requirements which would be provided on the $4\frac{1}{4}$ and 6 per cent interest bases.

The facts developed in the tabulation on exhibit page B-1 further support my opinion and conclusion that the degree to which the reserve balance accrued on a straight-line basis in number of dollars and years of future retirement liability anticipate the possible need for retirement at cost, serves no useful economic purpose and that the degree to which a reserve accrued on a 3 per cent interest basis provides for and anticipates future liability to retire [14642] depreciable property at cost is fully adequate to serve all useful economic purposes.

Q. Have you prepared a comparison between the estimated retirements at cost of depreciable property to Pennsylvania Water & Power Company for moving 5 and 10 year periods ahead from each year from 1911-2010 and the reserve balances which would have been accrued on the straight line, and on the 3, 4¼ and 6 per cent bases? A. Yes, the results of the calculations of the retirement requirements for 5 and 10 year periods in advance from each year 1911-2010 are presented in the tabulation on exhibit page C-1 and graphically compared on exhibit page C-2 with the reserve balances which would result on the several bases as previously set forth in the tabulations on exhibit page A-6.

Q. Will you briefly explain the tabulation on exhibit page C-1 and the chart on exhibit page C-2? A. The tabulation on exhibit page C-1 consists of two parts, the first four columns accumulate the estimated retirements for moving 5 year periods and the second four columns for moving 10 year periods, thus for the five year moving period 1954-59 it would develop on the basis of the life estimates of Commission Exhibit 59, that \$1,875,342 dollars of liability to retire would mature and that for the ten-year period 1954-64 on the basis of the same estimates, [14643] liabilities to retire \$3,842,163 would mature and similarly for each 5 and 10 year moving period.

The purpose of these calculations is to provide a basis for comparison and a standard of adequacy of the reserve balances accumulated on the several bases previously calculated and set forth as is done in the chart on exhibit page C-2.

Reference to the chart on exhibit page C-2 discloses the extent to which the reserve balances (see tabulation on exhibit page A-6) on the several indicated bases exceed the liabilities to retire at cost for periods of five and ten years ahead.

Comparison of the estimated retirements for a moving five-year period with the reserve balances on the sev-

eral bases for each year of the 100 year period 1911-2010 indicates that on each and every one of the reserve accrual bases the balances far exceed any requirements and that the balances on the straight-line basis are many times the requirements at all times and literally huge by comparison.

It is also to be observed that the accrued net balance on the three per cent interest basis is substantially in excess of both five and ten year moving period estimated retirements and that only the reserve balance on a six per cent basis is ever low enough to approach the retirement needs for ten future years and that not until the 90th year. [14644] Q. Have you made calculations to determine the comparative rate base levels and stability resulting under alternative treatment of depreciation reserve balances accrued on the several alternative bases? A. Yes, I have made such calculations and determinations. The results are reflected in the tabulations on exhibit pages D-1 and D-2 and cartographically set forth in the chart on exhibit page D-3.

Q. Will you explain the tabulation on exhibit page D-1? A. The tabulation on exhibit page D-1 is set forth in parallel columns by years for the period 1946 to 2010. In column 2 there is set forth for each year the total investment, being the total plant investment at cost as of January 1, 1946, plus \$620,000 of working capital. It is assumed that retirements will be followed by replacements and that the total investment will thus remain constant over the entire period. Column 3 sets forth the difference between the investment and the year end balance in the depreciation reserve accrued on a straight-line basis. Columns 4, 5 and 6 are the differences between the total investments as set forth in Column 1 and the depreciation reserve balances accrued respectively on a 3 per cent, 4 $\frac{1}{4}$ per cent and 6 per cent basis.

For purposes of establishing the comparative level and stability of rate bases which would result under alternative [14645] treatment of depreciation reserve balances, the figures in column 2 under the heading "Total Investment"

are accepted to reflect the rate base under a nominal dollar investment standard with sinking fund provision for the cost of depreciable assets at retirement, the figures in column 3 as a rate base determined by deducting the straight-line accrued depreciation reserve balances from the total investment, the figures in column 4 as a rate base resulting from the deduction of the depreciation reserve balances accumulated on a 3 per cent compound interest basis, similarly the totals in column 5 reflect a rate base resulting from the deduction of depreciation reserve balances accrued on a $4\frac{1}{4}$ per cent compound interest basis, and similarly the figures in column 6 reflect a rate base which would result from the deduction of depreciation reserve balances accrued on a 6 per cent compound interest basis from the total investment.

Only on the nominal dollar investment standard does the rate base remain constant. The total investment less straight-line accrued depreciation reserve balances set forth in column 3 fluctuates widely from a high of \$23,545,830 in 1946 to a low of \$17,405,925 in 1993, a range of \$6,140,000. The total investment less the depreciation reserve balances accumulated on a 3 per cent compound interest basis set forth in column 4 fluctuates from a high of \$27,895,315 in 1946 to a low of \$21,095,006 in 1993, a range of \$6,800,000. The [14646] total investment less the depreciation reserve balance accumulated on a $4\frac{1}{4}$ per cent compound interest basis set forth in column 5 fluctuates from a high of \$29,127,407 in 1946 to a low of \$22,467,037 in 1993, a range of \$6,660,000. The total investment less the depreciation reserve balances accumulated on a 6 per cent compound interest basis set forth in column 6 fluctuates from a high of \$30,376,471 in 1946 to a low of \$24,108,754 in 1993, a range of \$6,268,000.

The full range of fluctuation and comparative subsequent rate base levels can only however be appreciated when the rate bases determined by reserve balance deduction are compared with the total investment. Thus the

low of \$17,405,925 in 1993 on the straight line basis which was found to be \$6,140,000 below the 1946 level on the same basis, is \$16,134,813 below the investment made.

Fluctuations in dollar amounts under the 3, 4 $\frac{1}{4}$ and 6 per cent compound interest bases increase as the interest factor used decreases thus are least on the 6 per cent compound interest basis (21 per cent), next lowest is on the 4 $\frac{1}{4}$ per cent interest basis (23 per cent), higher for the 3 per cent compound interest basis (24 per cent), but highest on the straight line basis (26 per cent).

After reaching their respective lows in 1993 the fluctuating straight line and compound interest rate bases again [14647] rise to secondary highs in the year 2007 with \$21,756,321 for the straight line basis, \$24,703,192 for the 3 per cent compound interest basis, \$25,696,423 for the 4 $\frac{1}{4}$ per cent compound interest basis, and \$26,843,517 for the 6 per cent compound interest basis. These secondary highs are exceeded only by the rate bases prior to 1950 in the case of the straight line basis, prior to 1954 in the case of the 3 per cent compound interest basis. Only back as far as 1970 would the balance on the 4 $\frac{1}{4}$ per cent compound interest basis fall below the secondary high of \$25,696,423 in the year 2007. Similarly with respect to the 6 per cent compound interest basis, it may be observed that the secondary high of \$26,843,517 in the year 2007 was last previously reached or exceeded in 1971.

In order to afford ready comparison among and between the rate base levels which would maintain under the assumed treatment of depreciation reserve balances on a sinking fund, a straight-line basis and the compound interest bases at 3, 4 $\frac{1}{4}$ and 6 per cent their comparative magnitudes are reduced to a percentage relationship in the tabulation on exhibit page D-2. The sinking fund rate bases being a constant amount is treated as 100 per cent. The comparative magnitudes of the presumptive rate bases under the straight line and compound interest bases are represented as percentages of the total investment.

[14648] On the basis of the life estimates of Commission Exhibit 59 a rate base determined by the deduction of straight line accrued reserve balances from the investment would give a rate base for 1946 of only 70.2 per cent of the investment. Assuming deduction of depreciation reserve balances accrued on a compound interest base at 3 per cent the rate base would be only 83.2 per cent of the actual investment, accrued on a $4\frac{1}{4}$ per cent interest basis and deducted from the investment the resulting rate base would be 86.8 per cent, and accrued on a 6 per cent compound interest basis, deduction of the depreciation reserve balance would leave a rate base of 90.6 per cent of the investment.

The maximum reserve balances are found to develop by 1993. In that year the investment less a straight accrued reserve balance would leave a rate base of only 51.9 per cent of the actual investment. A deduction of a depreciation reserve balance accrued on a 3 per cent compound interest basis would leave a rate base of only 62.9 per cent of the investment. A deduction of a depreciation reserve balance accrued on a $4\frac{1}{4}$ per cent compound interest basis would leave a rate base equal to only 67 per cent of the investment, and a deduction of a depreciation reserve balance accrued on a 6 per cent compound interest basis would leave a rate base equal to only 71.9 per cent of the investment in 1993.

[14649] On the average over the period 1946 to 2010 the deduction of the reserve accrued on a straight-line basis would result in an average rate base of only 58 per cent of the total investment. Similar average relationships to the total investments on the compound interest basis at 3 per cent would be 70 per cent, on $4\frac{1}{4}$ per cent basis would be 75 per cent, and on the 6 per cent basis would be 79 per cent.

The comparative levels and the character and extent of the fluctuations in the rate bases resulting from the alternative treatment of depreciation reserve balances ac-

crued on 3, $4\frac{1}{4}$ and 6 per cent compound interest and the straight-line bases are graphically set forth in the chart on exhibit page D-3. In contrast with the constant investment rate base associatable with use of the sinking fund provision for depreciation, the bases of rates associated with compound interest and straight-line accruals for depreciation fluctuate frequently and substantially. The rapid decline in the bases of earnings in the ten years 1946-1956 is particularly noticeable. Three general levels are clearly discernable, the sinking fund basis reflecting 100 per cent of the investment remaining constant throughout the period, the straight-line basis falling sharply to 1956 and remaining characteristically well below 60 per cent of the investment is at the low extreme. The 3, $4\frac{1}{4}$ and 6 per cent compound interest bases follow the middle ground, holding most [14650] characteristically at a level representing from 70 to 80 per cent of the investment.

Q. What conclusions would you draw from the tabulations on exhibit pages D-1, D-2 and the chart on exhibit page D-3? A. I conclude that the accrual of a depreciation reserve on a straight-line basis for long life property such as that of the Pennsylvania Water and Power Company and the treatment of such a huge reserve balance as an item deductible from the investment for rate base purposes, results in an arbitrarily deflated and highly fluctuating rate base and imposes a responsibility on the enterprise of employing the assets reflecting such depreciation reserve balances by the assumption of additional risks, hazards and uncertainties if the company is to maintain a fair rate of earning power on its investment. I conclude further that on the assumption that depreciation reserve balances are to be deducted from the nominal dollar investment in utility property that the method of accrual which results in the smaller reserve balances imposes the least in the way of an unfair burden upon the investment. In my opinion these tabulations set forth clearly the reasons why the application of any method of

accrual such as the straight-line basis operates absurdly and unfairly in a case of enterprises having a large proportion of exceedingly long lived property.

[14651] Q. Have you made a determination of the annual rates of return actually earnable on the total investment in property assuming an intended $6\frac{1}{2}$ per cent fair rate of return, deduction of depreciation reserve balances accrued on a straight-line basis and retirements of property on the basis of the life estimates as indicated in Commission Exhibit 59?

A. Yes, I have calculated what the annual rates of return actually earnable would be for every 10th year 1946-2005 and for the year 2010 on the total investment in the rate base. I have also calculated the average cumulative rates of return for various periods ending by selected years 1946-2010. The results of these calculations are presented in the two tabulations on exhibit page E-1.

Q. Will you briefly explain the statistical tabulations on exhibit page E-1?

A. There are two tables on exhibit page E-1. The first sets forth the annual rates of return actually earnable; the second sets forth the average cumulative rates actually earnable over selected periods of years. With respect to the first tabulation which has been limited to the year 1946 and every 10th year to the year 2005 and the year 2010 for the sake of brevity, column 2 sets forth the total investment in the rate base. This total is developed on the assumption that property retirements would be followed by property replacements and that no expansion of plant took place. [14652] Consequently the total investment in the rate base remains constant throughout the period and for each year. The third column records the accumulated depreciation reserve balance which would have developed on a straight-line basis using the life estimates indicated by Commission Exhibit 59.

The 4th column records the difference between column 2 and column 3, namely the investment less the depreciation reserve.

The fifth column records the number of dollars which would constitute a $6\frac{1}{2}$ per cent return on the investment.

The sixth column records the number of dollars which constitute a $6\frac{1}{2}$ per cent return on the investment less the reserve, that is the sums in column 4.

The seventh column records the amount by which a $6\frac{1}{2}$ per cent return on the investment less the reserve would fail to equal the intended $6\frac{1}{2}$ per cent return on the amount actually invested.

Column 8 records the percentage relationship between the sums in column 6 and the investment in the rate base as indicated in column 2.

Column 9 is the difference between the rate actually earned as indicated in column 8, and the intended $6\frac{1}{2}$ per cent rate of return.

Columns 10 and 12 record the rate of return which would be earned on the total investment assuming that the rate [14653] earned as indicated in column 8 were supplemented in the first instance by average earnings of 2 per cent on the assets reflected by the reserve balance, and in the second instance if supplemented by 3 per cent earnings on the assets reflecting the reserve balance.

Columns 11 and 12 indicate the deficiency in rate of return as against $6\frac{1}{2}$ per cent if 2 per cent and 3 per cent respectively were earned on the assets reflecting the depreciation reserve balance.

Reference to column 7 will indicate that the deficiency in return falls between \$649,669 and \$1,006,972, and that these deficiencies in return reduce the rate actually earnable on the actual investment to 4.56 per cent in 1946 which is 1.94 per cent return less than the assumed intended $6\frac{1}{2}$ per cent rate of return. Again for example in 1985 with a deficiency in return of more than \$1,000,000, the actual rate of return earnable would be only $3\frac{1}{2}$ per cent, a full 3 per cent less than the assumed intended $6\frac{1}{2}$ per cent rate of return.

When it is assumed that the utility enterprise could obtain a 2 per cent or a 3 per cent return on the assets reflecting the depreciation reserve balance without the as-

sumption of additional risks, hazards and uncertainties, the deficiencies in the over-all rate of return earned would become somewhat less, thus if the return of 4.56 per cent in 1946 can be supplemented by 2 per cent earnings on assets reflecting the depreciation reserve balance the actual [14654] return would increase to 5.16 per cent, a rate of return however 1.34 per cent below the intended $6\frac{1}{2}$ per cent rate of return. Similarly if it were reasonable to assume that the enterprise could earn 3 per cent on the assets reflecting the depreciation reserve balance the over-all rate of return earned on the utility rate base plus the earnings on the investment or employment of assets reflecting the depreciation reserve balance, the rate of return would rise to 5.45 per cent but still 1.05 per cent below the intended $6\frac{1}{2}$ per cent rate of return.

Analyzing the results for a year such as 1985 in a similar manner we find that the rate of return earnable on the total investment of 3.50 per cent would be increased to 4.42 per cent if 2 per cent could be earned on the assets reflecting the depreciation reserve balance and to 4.89 per cent if the assets reflecting the depreciation reserve balance could be assumed to earn 3 per cent without imposing on the enterprise additional risks, hazards and uncertainties.

It may be noted also that the actual rates of return earnable in the various years sampled would fluctuate widely from year to year.

The second tabulation on exhibit page E-1 makes a similar type of comparative analysis. It differs in that the results determined are cumulative for the periods selected rather than for particular years as above. The column [14655] headings are the same, the procedure is the same. The periods selected after 1946 are a five-year period 1946-51, a ten-year period 1946-55, a fifteen-year period 1946-59, and so on at five-year progressions until the entire period 1946-2010, covering the balance of the assumed maximum 100-year cycle is cumulated. The period

over which the lowest average rate of return would be earned is 1946-1998. An intended $6\frac{1}{2}$ per cent rate of return would, under the assumptions previously set forth, yield only 3.72 per cent on the average investment in the rate base. If 2 per cent could be earned on the assets reflecting the depreciation reserve balance the average rate would be increased to 4.58 per cent and if 3 per cent could be assumed earnable on the assets reflecting the depreciation reserve balance, without the imposition of additional risks, hazards and uncertainties on the enterprise, a five per cent rate of return would be earned, which five per cent is however $1\frac{1}{2}$ per cent below the assumed actually intended fair rate of return.

Q. Have you made a similar determination of the annual rates of return actually earnable on the compound interest bases at three per cent, $4\frac{1}{4}$ per cent and six per cent? A. Yes, such calculation has been made on both an annual and a cumulative period basis. The results on an annual basis for every tenth year 1946-2005 and for the year 2010 are set forth on exhibit page E-2 and cumulatively on [14656] exhibit page E-3. The assumptions made in connection with the tabulations on exhibit page E-2 are the same as those made in connection with the tabulations on exhibit page E-1. The difference between E-1 and E-2 and E-3 is simply the substitution of the compound interest bases for the straight-line basis of accrual in connection with the tabulations on exhibit pages E-2 and E-3. The tabulation on exhibit page E-2 is in three parts in order to set forth results under the three alternative assumptions of compound interest at 3 per cent, $4\frac{1}{4}$ per cent and at 6 per cent.

The results indicated by columns 8, 10 and 12 under the heading "Compound Interest at 3 Per cent" disclose that the intended fair rate of return of $6\frac{1}{2}$ per cent could not actually be earned under any of the assumptions and conditions set forth. The nearest approach to earning the $6\frac{1}{2}$ per cent intended rate of return would be in 1946 on the

compound interest basis at 6 per cent. On the assumption that 3 per cent could be earned on the assets reflecting the depreciation reserve balance, the earning rate of 6.17 per cent is still .33 per cent below the intended fair rate of return of $6\frac{1}{2}$ per cent.

It is noted as observed above that the rates of return actually earnable on the various bases and under the several assumptions vary markedly from year to year. It is also appropriately observed that the selection of compound interest [14657] bases at 3 per cent, $4\frac{1}{4}$ per cent or 6 per cent makes a significant difference in the rate of return earnable on the investment.

The tabulation on exhibit page E-3 sets forth the results as the actually earnable rate of return and the deficiency in the return under the alternative conditions and several assumptions previously enumerated for various periods of years by five-year increments from 1946-2010. Taking the period 1946-1951 as an illustration it is found that after assuming that the assets reflected by the reserve balance could earn 3 per cent without imposing additional risks, hazards and uncertainties on the enterprise, the overall rate of return earnable on the total investment would still be .69 per cent short of the intended $6\frac{1}{2}$ per cent fair rate of return on a 3 per cent compound interest basis, and that similarly on a $4\frac{1}{4}$ per cent compound interest basis there would still be a deficiency of more than .54 per cent, and that on a 6 per cent compound interest basis there would be a deficiency of .4 of one per cent.

It will be observed that the results for the five-year period 1946-1951 are better than those for any other period. Looking at the longer term, 1946-2010, and assuming 3 per cent earned on the assets reflecting the depreciation reserve balance the deficiency on a 3 per cent compound interest basis is over 1 per cent and similarly on a $4\frac{1}{4}$ per cent [14658] compound interest basis is .9 of one per cent and a 6 per cent compound interest basis is .73 per cent.

It is immediately observable that when the tabulations on exhibit pages E-2 and E-3 are compared with those on exhibit page E-1 the use of the compound interest basis of accrual at 3 per cent, $4\frac{1}{4}$ per cent and 6 per cent does not impose anywhere near the penalty on the investment which is exacted by the employment of the straight-line basis of accrual and reserve balance deduction for rate base purposes.

Q. Have you also made a tabulation and calculation of rates of return actually earnable and the deficiency in the return if any on the sinking fund basis? A. Yes, I have made such calculations and prepared the tabulation set forth on exhibit page E-4 for every tenth year, 1946-2005, and the year 2010 and also a tabulation on exhibit page E-5 cumulating the results over selected periods of time.

Q. Will you briefly explain the tabulation on exhibit page E-4? A. The form and procedure that is involved in the tabulation on exhibit page E-4 is identical with that used in the upper half of the tabulation on exhibit page E-1 and the tabulation on exhibit page E-2. The differences to be noted are that the reserve accrual is assumed to take place on a sinking fund basis at 3 per cent, $4\frac{1}{4}$ per cent and [14659] 6 per cent, and that instead of deducting accumulated reserve balances from the investment for rate base purposes the interest component is made an annual credit to the depreciation reserve and a deduction from the amount which constitutes $3\frac{1}{2}$ per cent return on the investment.

It will be immediately observable that under the sinking fund basis at 3 per cent and under the assumption that the assets reflected by the depreciation reserve balance will earn 3 per cent the full intended fair rate of return of $6\frac{1}{2}$ per cent is actually earnable. If less than 3 per cent is actually earnable the sinking fund basis at 3 per cent results in a deficiency in the rate of return earned as indicated in columns 9 and 11. It becomes equally apparent therefore also that the use of the sinking fund basis at $4\frac{1}{4}$ per cent can not result in an actual earning of the intended

6½ per cent fair rate of return unless it were assumed that the assets reflecting the depreciation reserve balance could earn as much as 4¼ per cent without imposing additional risks, hazards and uncertainties on the enterprise. In no case are any of these calculations or any of these assumptions carried beyond a 3 per cent earning return on the assets reflecting the depreciation reserve balance since it is a matter of common knowledge that more than 3 per cent can not be earned without the assumption of additional risks, hazards and uncertainties for which [14660] compensation must be obtained unless the investor is to be exploited.

The tabulation on exhibit page E-5 establishes the results which would develop over periods of time in five-year increments and is comparable in every other respect to the tabulations on exhibit page E-4. The sinking fund basis at 3 per cent, assuming that three per cent could be earned on the assets reflecting the depreciation reserve balance, would make it possible to earn the intended 6½ per cent fair rate of return. Any earning rate in fact less than 3 per cent would make it impossible actually to earn the intended fair rate of return either on a 3 per cent, 4¼ per cent or 6 per cent basis.

Q. Have you brought together for ready comparison results of your calculations as to the comparative rates of return actually earnable under alternative methods of reserve accrual, rate base treatment and assumed earnings rates on the assets reflecting the depreciation reserve balances? A. Yes. The actual earnings rate of returns and deficiencies in return on the assumption of no income from reserve investments and 2 per cent earned on reserve investments and 3 per cent earned on reserve investments for the straight line, compound interest and sinking fund methods and for the sinking fund and compound interest methods at 3 per cent, 4¼ per cent and 6 per cent for periods of [14661] years by five-year increments from 1946-2010 are summarized in the tabulation on exhibit page E-6.

Q. Will you explain briefly some of the relationships to be observed in the tabulation on exhibit page E-6? A. It is readily observable that the only combination of circumstances under which it is possible to earn the intended fair rate of return is found under the sinking fund method on a 3 per cent basis. All other combinations of factors and circumstances result in a greater or lesser penalty in the form of a deficiency in the rate of return. This penalty in general increases with the magnitude of the reserve balance accrued and as the rate of return on the assets reflecting the reserve balance decreases.

The application of the straight-line method imposes the largest penalty on the investor because it operates to build up the largest reserve most quickly. Even though the reserve balances under the 3 per cent, 4¼ per cent and 6 per cent compound interest methods be deducted from the investment for rate base purposes, the penalty is not comparable to that which the investment suffers under the application of the straight-line method and becomes generally less as the interest rate employed under the compound interest method increases, again obviously because of the slower accrual of a depreciation reserve balance by this method.

[14662] Q. Have you prepared additional tabulations and charts showing in detail the annual rates of return actually earnable under alternative methods of depreciation reserve accrual and treatment for rate base purposes? A. Yes, in the tabulations on exhibit pages F-1, F-3, and F-5 I have set forth the annual rates of return actually earnable under alternative methods of depreciation reserve accrual and regulatory treatment of such reserve accruals on the straight-line basis, compound interest and sinking fund bases at 3 per cent, 4¼ per cent and 6 per cent. The assumptions underlying these tabulations and determinations are the same as those previously set forth for similar tabulations.

The tabulations on exhibit pages F-1, F-3 and F-5 differ however from those previously set forth on exhibit pages E-1 to E-5 in that the columns indicating the derivation of the actually earnable rates of return have been eliminated for brevity's sake and only the results in terms of actually earnable rates of return are recorded. These tabulations differ however also from those previously offered in that the actually earnable rates of return under the several assumptions and alternative bases are reported for each year 1946-2910.

The tabulation on exhibit page F-1 compares the results under the straight-line basis with those which would maintain [14663] on the compound interest and sinking fund bases at 3 per cent. The tabulation on exhibit page F-3 similarly compares the results obtainable on the straight-line basis with the results which would be obtainable on the compound interest and sinking fund bases at $4\frac{1}{4}$ per cent, while the tabulation on exhibit page F-5 compares the results which would be obtained on the straight-line basis with those obtainable on the compound interest and sinking fund bases at 6 per cent. Otherwise, the tabulations on exhibit pages F-1, F-3 and F-5 are similar.

The tabulation on exhibit page F-1 also proceeds to determine what the effective rate of return actually earnable on the total investment would be if 2 per cent could be earned on the assets reflecting the reserve balance and if 3 per cent were earnable on the assets reflecting the reserve balance as compared with what the rate of return on the total investment would be if no income were obtainable by employment of the assets reflecting the reserve balance.

It is immediately observable that on the sinking fund basis at 3 per cent, and assuming that 3 per cent could be earned on each and every dollar of assets reflecting the depreciation reserve balance from the end of the year in which it was accrued to the time when it would be required to pay the cost of property retired, the enterprise could actually earn the $6\frac{1}{2}$ per cent intended fair rate of return.

It is also readily observable that the lowest actual [14664] rate of return to be earned yearly is under the assumption of straight-line accrual of depreciation reserve balances and their deduction from the investment for rate base purposes. When no income is assumed to be earned on the assets reflecting the reserve balance these rates of return are set forth in column 2 and are in every year the lowest actually earnable rates of return as compared with the results under other bases and methods.

It may further be observed that assuming 2 per cent and 3 per cent earnings on assets reflecting the reserve balance the actually earnable rate under the straight-line method is always lower than that obtainable under the alternative compound interest and sinking fund methods.

It is also worthy of note that the average earning rate on the straight-line basis drops rapidly from 1946 to 1959 by almost 1 per cent, reaches 3.49 per cent in 1964 and the period low of 3.37 per cent in 1993 on the assumption that there is no outside income from the investment of depreciation reserve balances. On the assumption that 2 per cent average earnings on assets reflecting the depreciation reserve balances could be earned, the actual earning rate on the straight-line basis nevertheless drops rapidly from 1946 at 5.16 per cent to 4.48 per cent in 1959 and falls as low as 4.33 per cent by 1993.

Even when reserve investments earn 3 per cent, the maximum [14665] earnable without the assumption of additional risks, hazards and uncertainties by the enterprise, the actually earnable rate of return on the straight-line basis, which in 1946 would already be 1.05 per cent below the intended fair rate of return of $6\frac{1}{2}$ per cent, falls further to 4.93 per cent in 1959, and to 4.81 per cent by 1993.

The penalty on the investor is largest under the straight-line method and generally larger as lower rates of earnings on assets reflecting the depreciation reserve balances are assumed available to supplement the inadequate return on rate base investment.

All of these facts are visually presented in the 3 part chart on exhibit page F-2, from which it may be additionally observed that even under the 3 per cent sinking fund method the actually earnable rate of return falls substantially below the intended $6\frac{1}{2}$ per cent when reserve assets earn no return, and that even when earnings on the assets reflecting the reserve balance earn 2 per cent the total return to the investment falls short of reaching the intended $6\frac{1}{2}$ per cent.

Reference to part 3 of the chart on exhibit page F-2 indicated that even when a maximum 3 per cent rate on reserve investments is earned the actually earnable total return under the straight-line basis falls rapidly to 1956 and holds well down to and often below a 5 per cent actually [14666] achievable rate of return. For the ensuing 40 years, it is generally $1\frac{1}{2}$ per cent below the intended fair rate of return.

The tabulation on exhibit page F-3 is similar to that on exhibit page F-1 except that the calculations reflect the results under the compound interest and sinking fund methods at $4\frac{1}{4}$ per cent instead of 3 per cent. The figures in columns 2, 5 and 8 for the straight-line method are the same as those found in the tabulation on exhibit page F-1 and are reintroduced here for ready comparison purposes with the changed results obtained on the compound interest and sinking fund bases at $4\frac{1}{4}$ per cent.

The general effect of a change from a 3 per cent to a $4\frac{1}{4}$ per cent basis for the compound interest and sinking fund methods is two-fold. It makes the results on the sinking fund basis disadvantageous to the investor even when 3 per cent is earnable on the assets reflecting the reserve balance and increases the disadvantage of the investor under the sinking fund method when 2 per cent and no per cent income is derived from reserve investment as compared with the results found under the same assumptions in the tabulation on exhibit page F-1.

This tendency is explained by the fact that a $4\frac{1}{4}$ per cent sinking fund basis assumes in effect that the enterprise pays $4\frac{1}{4}$ per cent for the use of consumer advanced [14667] assets reflected by the depreciation reserve balances and if the enterprise is able to earn only 3 per cent, without the assumption of additional risks, hazards and uncertainties, it loses $1\frac{1}{4}$ per cent on each dollar for which it has the responsibility of safekeeping until a time when it is needed to pay the cost of property at retirement.

On the other hand the results under the $4\frac{1}{4}$ per cent compound interest basis are less confiscatory of the intended $6\frac{1}{2}$ per cent rate of return than they were on a 3 per cent basis. This follows from the fact that the compound interest method at $4\frac{1}{4}$ per cent would not accrue a punitively deductible reserve balance as rapidly as one calculated on a 3 per cent basis. The improvement in the investor's position under the $4\frac{1}{4}$ per cent compound interest basis may be observed by comparing the rate of return actually earnable in 1946 assuming 3 per cent earned on the reserve investment of 5.91 per cent with the rate of 6.04 per cent similarly earnable on a $4\frac{1}{4}$ per cent compound interest basis, or by comparing the results for 1959 when on a 3 per cent compound interest basis, and assuming 3 per cent earnable on reserve investment, the actual rate of return on the total investment would be 5.45 per cent as compared with 5.61 per cent on a $4\frac{1}{4}$ per cent compound interest basis.

All of these and other relationships are again graphically set forth in the 3 part chart on exhibit page F-4. Previously [14668] noted trends and relationships are clearly observable but also the above mentioned fact that even when 3 per cent earnings of reserve investments are assumed a $4\frac{1}{4}$ per cent sinking fund basis fails to earn the intended fair rate of return of $6\frac{1}{2}$ per cent.

The tabulation of exhibit page F-5 is comparable with those presented on exhibit pages F-1 and F-3 except that

the compound interest and sinking fund bases have been made at a 6 per cent rate.

The trends previously observed with respect to the changed relationships which resulted from the substitution of a $4\frac{1}{4}$ per cent interest rate for a 3 per cent interest rate and the calculations of the actually earnable rates on the compound interest and sinking fund bases are here found to be carried further. Thus the actually earnable rate of return on the sinking fund basis at 6 per cent falls even further below the intended fair rate of return of $6\frac{1}{2}$ per cent under all the circumstances found for similar calculations at $4\frac{1}{4}$ per cent and 3 per cent. Thus in 1946 the actually earnable rate of return under the sinking fund basis, assuming 3 per cent earnable on the reserve investment, which was $6\frac{1}{2}$ per cent on a 3 per cent sinking fund basis, would fall to 6.34 per cent when a $4\frac{1}{4}$ per cent sinking fund method was used and falls to 6.21 per cent when a 6 per cent sinking fund method is used.

[14669] For 1964 the actual earning rate, assuming 3 per cent earned on reserve investment, falls to 5.83 per cent under the 6 per cent sinking fund method or .67 per cent below the intended fair rate of return.

The other observed trend also continues with the change from $4\frac{1}{4}$ per cent to 6 per cent compound interest and sinking fund bases, namely, that the penalty which deduction of the reserve balance accrued on a compound interest basis imposes on the investor decreases even further from that indicated in the tabulation on exhibit page F-3. Thus taking 1959 as an example it is found that the actually earnable rate of return on the $4\frac{1}{4}$ per cent compound interest basis assuming 3 per cent earned on reserve investment was 5.61 per cent whereas on a 6 per cent compound interest basis it rises to 5.77 per cent which, however, is .73 per cent below the intended fair rate of return of $6\frac{1}{2}$ per cent.

All of these and other relationships are again set forth in the 3rd part of the chart on exhibit page F-6. Com-

parison of these charts with those previously presented on exhibit pages F-2 and F-4 indicates that the penalty which the use of the straight-line method imposes is unchanged by the changed assumptions as to the interest factor in the sinking fund and compound interest bases.

It follows further that the penalty effect of the use of the compound interest method at the higher interest rates [14670] of $4\frac{1}{4}$ per cent and 6 per cent tends to be reduced and that the penalty factor in a sinking fund calculated at 6 per cent increases progressively as the interest factor employed more substantially exceeds the maximum earning rate which it may be assumed could be obtained by the enterprise without the assumption of additional risks, hazards and uncertainties. In fact it may be observed from the charts on exhibit page F-6 that the decrease in the penalty which results from the use of the compound interest methods at higher rates of interest and the increase in the penalty which would result from the use of the higher rates in connection with the sinking fund method results in an approachment between the results obtained under the sinking fund and compound interest methods.

The extent to which this has developed is indicated by the closeness of the lines portraying the results under the sinking fund and compound interest methods respectively under all three assumptions of no income on reserve investments, 2 per cent earnings on reserve investment and 3 per cent earnings on reserve investments.

[14671] Q. Have you made calculations and prepared tabulations which compare the actually earnable rates of return on the basis of various depreciation reserve accruals and alternative treatment for rate base purposes with the annual rates of return which would be required under the various combinations of circumstances and regulatory treatment of reserve balances so as to actually yield an intended predetermined fair rate of return of $6\frac{1}{2}$ per cent? A. Yes, I have made such calculations and pre-

pared tabulations substantially paralleling the calculations and tabulations presented on exhibit pages F-1, F-3 and F-5. They are offered in tabular form on exhibit pages G-1, G-2, G-3, G-4 and G-5.

The tabulations on exhibit page G-1 compare the annual rates of return actually earnable on the straight-line basis, assuming reserve balance deduction, with the annual rates of return which would be required to yield an intended fair rate of return of $6\frac{1}{2}$ per cent after the impact of such regulatory treatment.

The first tabulation on exhibit page ~~G-1~~ establishes these relationships for certain selected years at 10-year intervals and for the year 2010. Assuming that 3 per cent can be earned on the reserve investment without the imposition of additional risks, hazards and uncertainties on the enterprise, we find from column 6 for example that in 1946 [14672] the actual earnable return is 5.45 per cent instead of the intended $6\frac{1}{2}$ per cent. In column 7 the gross rates of return which would have to be allowed if the actually earnable rate of return is to be $6\frac{1}{2}$ per cent are set forth.

Thus, for 1946, assuming straight-line depreciation accrual, deduction of reserve balances from the investment, a rate of return of 7.75 per cent would be required so as to actually yield $6\frac{1}{2}$ per cent on the total investment. In subsequent years it will be seen that even higher rates of return would be required to actually net $6\frac{1}{2}$ per cent on the investment.

If less than 3 per cent is earnable on the reserve investment even higher gross rates of return must be envisioned if the result is actually to be a $6\frac{1}{2}$ per cent return on the investment. Thus, in 1946 on the assumption of 2 per cent earnings on the reserve investment, a rate of return of 8.19 per cent would be required to yield $6\frac{1}{2}$ per cent, and if no income were earnable from the reserve investment a gross return necessary to yield $6\frac{1}{2}$ per cent on the investment would be 9.27 per cent. In later years the

gross rates of return would have to be substantially higher as the penalty of larger reserve balances operates to reduce the effective return on the investment further below the intended $6\frac{1}{2}$ per cent fair rate of return.

The second tabulation on exhibit page G-1 compares the [14673] average cumulative rates of return actually earnable on a straight-line basis, assuming reserve balance deduction with the average cumulative rate of return which would be required to yield an intended fair rate of return of $6\frac{1}{2}$ per cent on the investment after the impact of reserve balance deduction.

The periods are from 1946-51 and for periods increasing in five-year steps. The results over substantial periods of time indicate that the gross rate of return necessarily sought to yield an actual $6\frac{1}{2}$ per cent rate of return on the investment is substantially above $6\frac{1}{2}$ per cent for all periods and under all conditions.

Thus for the period 1946-55 a gross rate of return of 8.05 per cent would be required actually to yield $6\frac{1}{2}$ per cent on the investment assuming 3 per cent were earnable on the reserve assets.

If only 2 per cent were earnable on the reserve assets the gross rate of return required to yield $6\frac{1}{2}$ per cent would be 8.64 per cent and if no income were obtainable from the reserve investment a gross return of 10.13 per cent would be required actually to yield a $6\frac{1}{2}$ per cent fair rate of return on the investment.

The average cumulative rates of return required to provide $6\frac{1}{2}$ per cent on the investment are for longer periods generally higher, reaching for the period 1946-1984 as high as 8.40 per cent assuming 3 per cent earned on the investment, [14674] 9.16 per cent assuming 2 per cent were earned on the investment and 11.21 per cent assuming the reserve assets to produce no income.

The tabulation on exhibit page G-2 compares the annual rates of return actually earnable on 3 per cent, $4\frac{1}{4}$ per cent and 6 per cent compound interest bases, assuming

reserve balance deduction with the annual rates of return which would be required to yield a fair rate of return of $6\frac{1}{2}$ per cent under such regulatory treatment.

The calculations are for selected periods of 10-year intervals and for the year 2010. Assuming, for purposes of illustration, that 3 per cent could be earned on the reserve assets for the year 1946 a gross rate of return of 7.15 per cent would be required to yield $6\frac{1}{2}$ per cent return on the investment.

For subsequent years it will be seen by reference to column 7 that the necessary gross rate of return would be even higher. If a $4\frac{1}{4}$ per cent compound interest basis were employed the necessary rate of return to yield $6\frac{1}{2}$ per cent for 1946, assuming 3 per cent to be earned on the reserve investment, would fall to 7 per cent. For later years it would be higher. If a 6 per cent compound interest basis were employed and 3 per cent is earnable on the reserve assets a gross rate of return of 6.85 per cent would be adequate to produce the intended rate of return of $6\frac{1}{2}$ per cent on the [14675] total investment. If less than 3 per cent is earnable on reserve assets a gross rate of return necessary to provide an actual return of $6\frac{1}{2}$ per cent increases under all circumstances and is generally higher when a 3 per cent and $4\frac{1}{4}$ per cent compound interest basis is employed than if a 6 per cent compound interest basis were used.

The tabulations on exhibit page G-3 are made on the same assumptions as those on exhibit page G-2 except they are for cumulative five-year incremental periods rather than for selected years. Again it will readily be seen that, even when it is assumed that 3 per cent can be earned on the reserve asset investment, the rate of return required actually to yield $6\frac{1}{2}$ per cent on the total investment on a 3 per cent compound interest basis would be 7.27 per cent for the period 1946-51.

It would have to be 7.72 per cent for the 100-year period 1946-2010.

As lower earning rates are assumed on reserve assets, the necessary gross rate of return rises as will be observed by reference to columns 3 and 5, but if the interest factor employed in the compound interest basis is increased from 3 to $4\frac{1}{4}$ per cent and 6 per cent the necessary gross rate of return which would actually yield an intended $6\frac{1}{2}$ per cent fair rate of return on the total investment falls. Thus on the 6 per cent compound interest basis for the period 1946-2010 a gross rate of return of 7.32 per cent would be adequate [14676] to yield $6\frac{1}{2}$ per cent on the investment, as compared with 7.72 per cent and 7.54 per cent on the 3 per cent and $4\frac{1}{4}$ per cent compound interest bases for the same period of time.

On Exhibit page G-4 tabulations similar to those presented on exhibit pages G-1 and G-2 are presented showing a comparison of annual rates of return actually earnable on the sinking fund basis with the annual rates of return required to yield an intended fair rate of return of $6\frac{1}{2}$ per cent.

It is immediately observable that, if it is assumed that reserve assets investment can earn 3 per cent without the imposition of additional risks, hazards and uncertainties on the investment, the gross rate of return required actually to yield $6\frac{1}{2}$ per cent on the investment is, under a 3 per cent sinking fund procedure, also $6\frac{1}{2}$ per cent.

It will be noted also by reference to column 7 that on a $4\frac{1}{4}$ per cent sinking fund basis it would take a rate of return of 6.66 per cent to 6.89 per cent for various years actually to produce a fair rate of return of $6\frac{1}{2}$ per cent on the investment.

If earnings of less than 3 per cent on reserve assets are assumed and a sinking fund basis at interest rates exceeding 3 per cent is used a gross rate of return of more than $6\frac{1}{2}$ per cent would be required actually to yield the intended fair rate of return of $6\frac{1}{2}$ per cent. For the year 1965 on a $4\frac{1}{4}$ per cent sinking fund basis and assuming [14677] 3 per cent earnable on reserve assets a gross 6.84

per cent rate of return would be required to yield an intended fair rate of return of $6\frac{1}{2}$ per cent.

Similarly for the year 1963 on a 6 per cent sinking fund basis, assuming 3 per cent earned on reserve assets, a gross 7.19 per cent rate of return would be required to yield an intended fair rate of return of $6\frac{1}{2}$ per cent.

The tabulations on exhibit page G-5 are similar to those on exhibit page G-4 except that they indicate the average cumulative gross rates of return which would be required to yield an intended fair rate of return of $6\frac{1}{2}$ per cent for selected periods of time 1946-51 and for 5-year increments thereafter.

The sinking fund basis at 3 per cent would actually earn the intended fair rate of return at $6\frac{1}{2}$ per cent and would require no gross rate of return higher than $6\frac{1}{2}$ per cent, assuming that 3 per cent can be earned on the reserve asset investment. If, however, a sinking fund basis at $4\frac{1}{4}$ per cent were employed and again assuming that 3 per cent can be earned on the reserve assets investment, the gross rate of return required would be higher than $6\frac{1}{2}$ per cent actually to yield a rate of return of $6\frac{1}{2}$ per cent on the total investment.

If a sinking fund basis at 6 per cent were employed even higher gross rates of return would need to be accepted actually [14678] to yield $6\frac{1}{2}$ per cent on the total investment. Thus for the period 1946-1951, 6.86 per cent would be required and for the entire period 7.20 per cent would be required. As previously noted in the analysis of similar tabulations, if earnings on reserve assets investment cannot be assumed to earn 3 per cent even the sinking fund basis at 3 per cent rate would fail to yield an actual return of $6\frac{1}{2}$ per cent and would therefore require a gross rate of return in excess of $6\frac{1}{2}$ per cent, as much for instance as 6.81 per cent for the entire period when 2 per cent earnings on reserve assets are assumed and 7.53 per cent if no earnings from reserve assets are assumed.

The necessary gross rates of return required under $4\frac{1}{4}$ per cent and 6 per cent sinking fund basis would have to be higher than the $6\frac{1}{2}$ per cent intended rate of return as may be seen by examination of the columns 3 and 5 under the headings "Sinking Fund at $4\frac{1}{4}$ per cent" and "Sinking Fund at 6 per cent."

Q. What is the purpose of the tabulation on exhibit page G-6? A. The tabulation on exhibit page G-6 brings together for quick and easy comparison cumulative rates of return actually earnable under alternative methods of depreciation reserve accrual and assumed regulatory treatment with the gross rates of return required under each set of conditions necessary [14679] to provide an intended actual $6\frac{1}{2}$ per cent fair rate of return on the investment.

The left-hand column arrays the various methods of depreciation reserve accrual from that method which yields the lowest actual rate of return and therefore requires the highest gross rate of return actually to yield $6\frac{1}{2}$ per cent on the investment to that method which would actually result in the intended fair rate of return of $6\frac{1}{2}$ per cent.

Columns 2, 3, 4, 5, 6, 7 and 8 under the heading "Return on Assets Reflected by Depreciation Reserve Balance" further classify the bases according to the interest factor employed. Column 9 under the general heading "Intended, Actual and Required Rates of Return" sets forth the intended rate of return which is assumed to be $6\frac{1}{2}$ per cent in each instance. Column 10 sets forth the rate actually earnable and Column 11 the gross rate of return required actually to yield the intended $6\frac{1}{2}$ per cent.

It will be seen that the straight-line method, assuming no earnings on reserve balances, is the most punitive in that the rate earnable over the entire remaining period of the 100 year cycle is only 3.77 per cent and that 11.21 per cent gross return would have to be employed to produce an actual intended return of $6\frac{1}{2}$ per cent.

The compound interest method at 3 per cent, assuming no earnings on depreciation reserve assets, is the next most

punitive with 4.58 per cent and would require a gross rate of return of 9.22 per cent actually to produce $6\frac{1}{2}$ per cent rate of return on the investment.

The third most punitive method is the straight-line basis assuming two per cent earnable on reserve assets. This method would allow an actual return of only 4.61 per [14680] cent and would require a gross rate of return of 9.16 per cent if it were to produce an actual return of $6\frac{1}{2}$ per cent on the total investment.

A compound interest basis at $4\frac{1}{4}$ per cent is in 4th most punitive position. This basis would allow a return of only 4.84 per cent if no earnings on reserve assets were assumed and would require a gross rate of return of $8\frac{7}{8}$ per cent to produce an actual rate of return of $6\frac{1}{2}$ per cent on the investment.

Among the several methods assuming 3 per cent earnable on reserve assets the straight-line method is most punitive in that it would allow a return of only 5.03 per cent and would require a gross rate of return of 8.40 per cent to produce an actual rate of return of $6\frac{1}{2}$ per cent.

It will be seen that the straight-line basis captures first, third and fifth positions as being most punitive and that even assuming 3 per cent as earnable on reserve assets it is more punitive than the compound interest basis at 6 per cent assuming no earnings on reserve assets, and also more punitive than the compound interest basis at 3 per cent assuming 2 per cent earnings on reserve assets and more punitive than the compound interest basis at $4\frac{1}{4}$ per cent assuming 2 per cent earnable on reserve assets and always and under all conditions more punitive than any sinking fund basis or any other compound interest basis.

[14681] Q. What in economic fact and effect is the provision for depreciation which is made as a charge to operating expenses? A. It is an installment payment by the consumer on account of the cost of depreciable property which it is expected will be met upon the retirement of such property. Provision for the cost of property upon retirement.

by periodic charges to operating expenses by consumers is in the nature of an advance, a deposit, a bond to assure a reasonable prospect of ultimate full payment. It is in the nature of a prepayment or advance because the ~~fact~~ of the property does not have to be met until the time of retirement.

Q. Is this progressive payment on account or advance, ahead of the time when the company requires it, of any value or service to the utility enterprise? A. Yes. Progressive prepayment on account up to some reasonable level improves the credit of the enterprise.

Furthermore, even though a retirement is not necessarily followed by reinvestment in a replacement and the replacement may at times cost more or less than the retired asset; the fact remains that the assets reflecting the depreciation reserve resulting from the prepayment of cost at retirement, serve the purpose of being available as resources to finance the replacement of retired property. This is the practical fact of everyday utility operation and was the purpose most [14682] generally recognized and urged by state regulatory statutes and agencies. The progressive accumulation of assets reserved to pay the cost of property upon retirement thus serves the purpose of keeping in the enterprise assets with which the cost of replacements can in whole or in part be met and thus serves a useful economic purpose not only for the enterprise as such but from the regulatory point of view by substantially assuring the ability of the enterprise to make retirements, renewals and replacements when economically justified so that the public interest in the continuity of the quantity and quality of the service will be protected.

The availability of assets reflecting the anticipation of retirement cost to the utility enterprise can also normally be of some direct advantage to the utility enterprise.

It is obvious that there is a lag between the time the reservation of revenue takes place and the time the cost of a retirement has to be met. How many dollars will be